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PAPER TRADE JOURNAL

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THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

"WE CAULKED THE LEAKY BUCKET

When We Switched To Tycol"

Lubrication was wasted like water from a leaky bucket until this company switched to Tycol Green Cast Grease for their bearings. Now a full third less grease is consumed than formerly . . . and there has been a complete absence of bearing burnouts with Tycol on the job.

Such savings aren't surprising because Tycol Green Cast Grease is compounded of pure paraffine base cylinder stock oils — oils that make possible a full-bodied grease with a minimum of **soap.** Soap is of little lubricating value, yet ordinary greases are chock-full of it — for "body." Such greases often separate under bad conditions, leaving thin oils that run away like water.

For economy and freedom from worry . . . for maximum lubrication per pound of grease . . . specify Tycol Green Cast Greases. Write for descriptive literature.

TIDE WATER ASSOCIATED OIL COMPANY
TIDE WATER DIVISION
17 Battery Place, New York, N. Y.

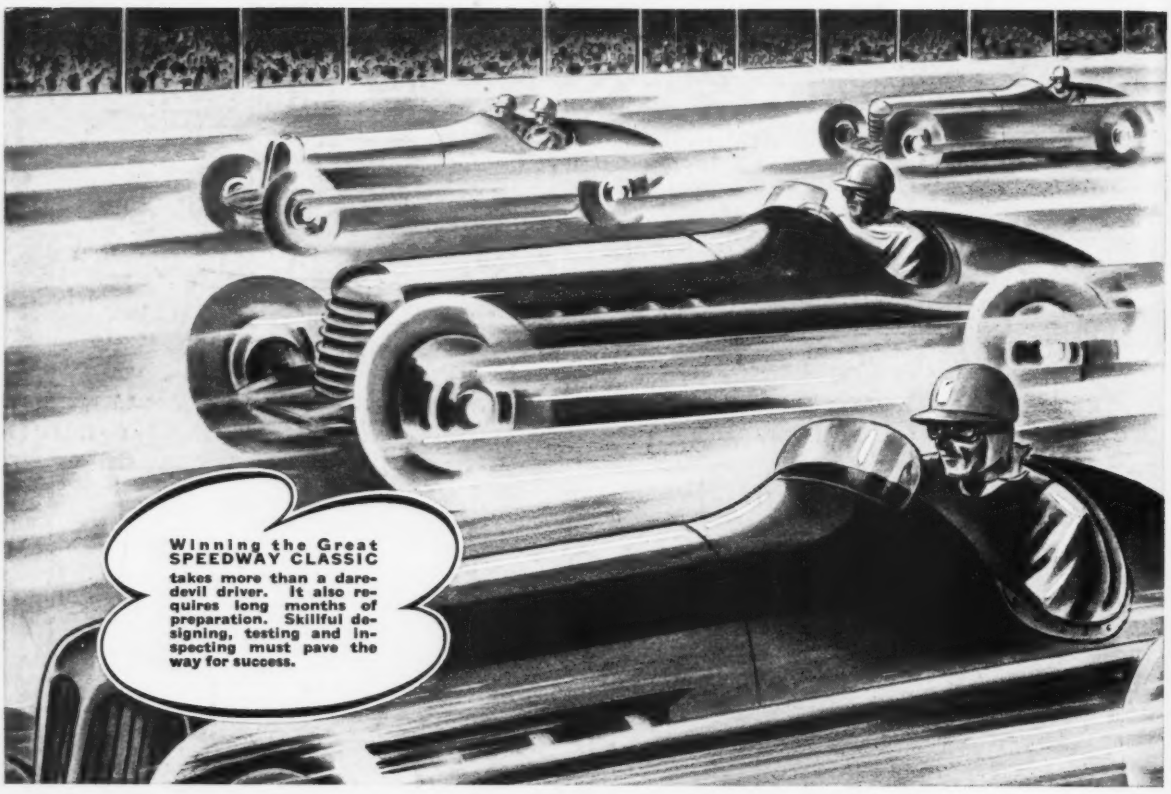
INDUSTRIAL TYCOL OILS-GREASES

TIDE WATER INDUSTRIAL LUBRICANTS

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE

MAY 12 1938

Vol. CVI
No. 19


Winning the Great
SPEEDWAY CLASSIC
takes more than a dare-devil driver. It also requires long months of preparation. Skillful designing, testing and inspecting must pave the way for success.

GREAT PERFORMANCE . . DEMANDS *Careful Preparation*

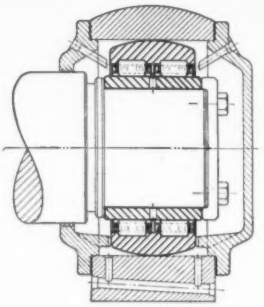
OUTSTANDING performance records constantly being made by Bantam Bearings are due to *careful preparation* which precedes each manufacturing operation.

Selected materials are pre-tested to determine hardness and durability. Special impact tests assure toughness. Innumerable inspections and re-inspections insure the exact qualities needed for each job. The finest craftsmen available safeguard Bantam quality every step of the way from ingot to finished product.

That's why Bantam Bearings have won an enviable reputation for dependability throughout the Paper industry.

BANTAM BEARINGS CORPORATION
South Bend, Indiana
Subsidiary of THE TORRINGTON CO., Torrington, Conn.

BANTAM BEARINGS



Cross section view of Bantam Dryer Bearings which are making outstanding production records in modern paper mills. Unique "Rocker" design provides positive self alignment and entirely eliminates sliding friction which must be overcome to permit self alignment in other types.

TAPERED ROLLER . . . STRAIGHT ROLLER . . . BALL BEARINGS

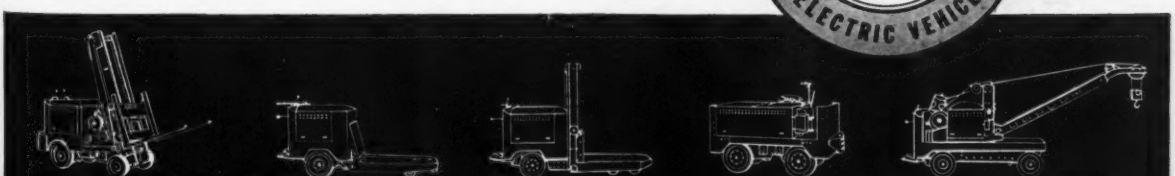
Entered as second class matter at the Post Office at East Stroudsburg, Pa., under the Act of Congress of March 3, 1879. Published every Thursday by the Lockwood Trade Journal Co., at 34 N. Crystal St., East Stroudsburg, Pa. Executive and Editorial office: 15 W. 47th St., New York, N. Y. Domestic subscription U. S. and possessions, $4.00 per year.

Three-high tiering in a large Southern mill with a Baker Telescoping Fork Truck. Load capacity 4000 pounds.

BAKER TELESCOPING FORK TRUCKS of the type shown are proving their value in many prominent mills. Thoroughly flexible, they handle paper rolls and pulp bales, load and unload cars and tier to the roof without change of equipment. Through faster deliveries, heavier loads, they set new lows in handling costs. Most have returned their entire cost in a few months' operation.

Check the savings you can make with Bakers in your own plant. Have the Baker Material Handling Engineer give you an estimate. Write today. INDUSTRIAL TRUCK DIVISION, *The Baker-Raulang Co.*, 2162 West 25th Sreet, Cleveland, Ohio.

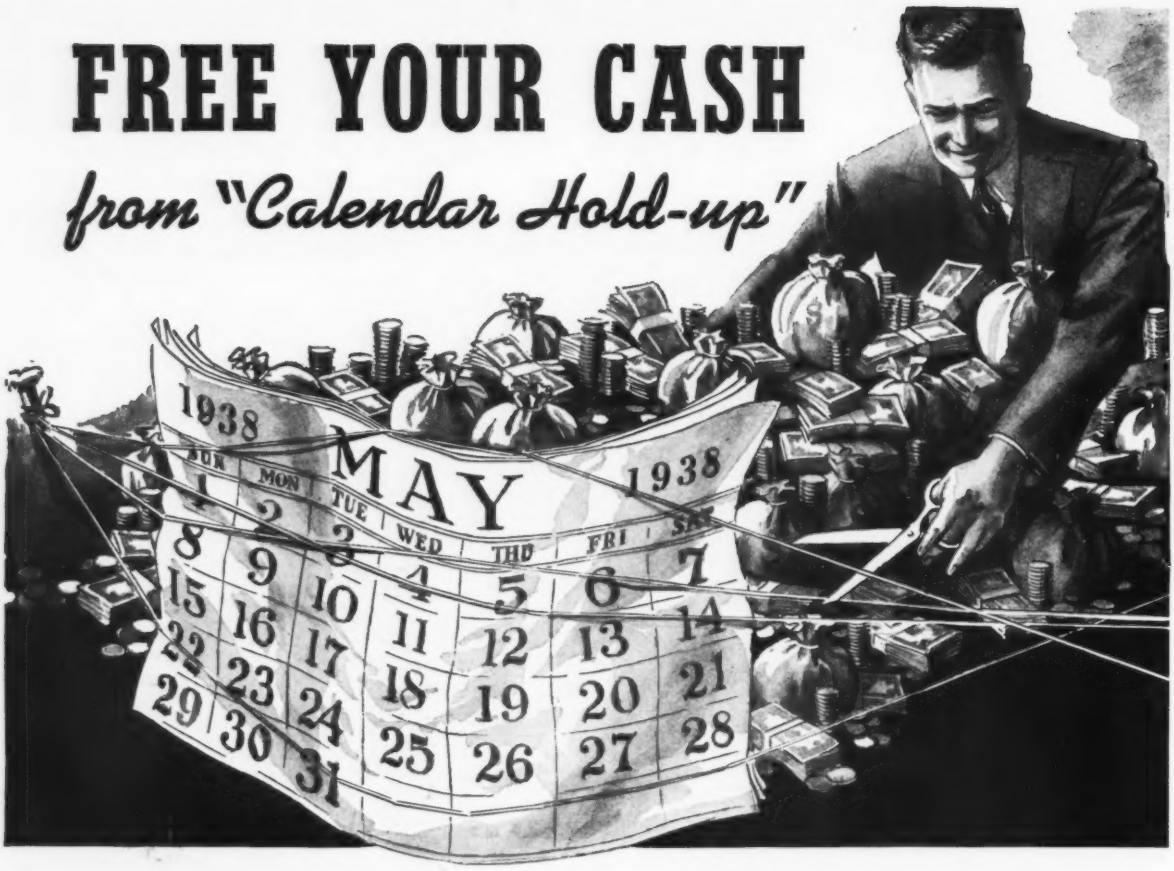
OLDEST MANUFACTURER
Baker
TRADE-MARK REG. U. S. PAT. OFF.
OF ELECTRIC VEHICLES



POWER INDUSTRIAL TRUCKS FOR EVERY PURPOSE

FREE YOUR CASH

from "Calendar Hold-up"



THIS MODERN FINANCING PLAN regulates collections, limits credit risks

WOULD you like to receive in a lump sum now the money that is owed you on open account?

Would you like to carry on your business so that immediately upon shipping and invoicing an order, the full proceeds in cash would be available to you?

Our open account financing plan does away with the 30 to 90 day wait for payment that you now endure. Your customers get their regular terms. You get your cash upon shipment . . . at a cost less than you'd allow them for cash discount. Your customers pay you as usual. And they are not notified of any change in your financing plans.

You keep full control of your business, pass credits and receive payments as made. You regulate your collections to your need for cash . . . selling us your receivables only in such amounts as your requirements call for.

In addition, under the LIMITED LOSS provision of our financing service, your credit losses cannot exceed a small pre-agreed percentage. We assume all the excess risk.

Make use of this flexible and economical plan of industrial financing. It assures you the extreme liquidity and high credit rating so helpful under present conditions.

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"Capital At Work"

Upon request, we will gladly mail you, without obligation, this concise booklet explaining our service. . . Simply send this coupon, attached to your letterhead.

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HELLER & MERZ
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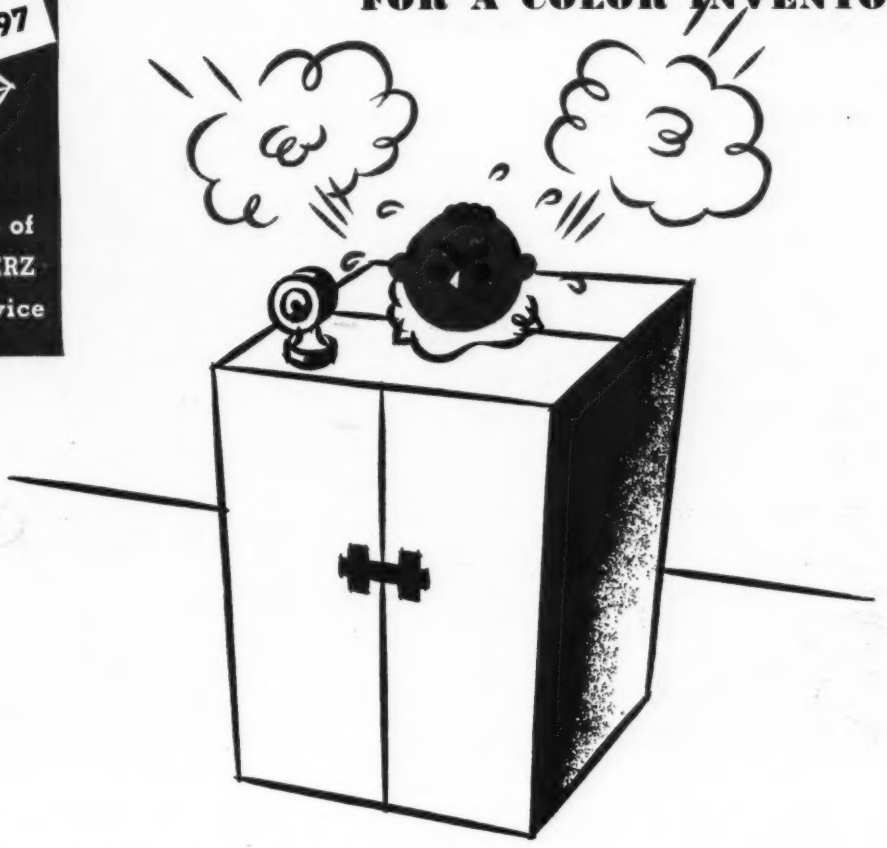
Reducing Treatment

FOR A COLOR INVENTORY



Excess poundage is unhealthy for any inventory. So, when a large mill thought their color inventory was overweight, they asked our Technical Service Division to check up on the 51 colors being used to produce their 350 stock shades.

Our men prescribed a reducing work-out that cut the inventory to only 30 colors—and still matched every shade perfectly. In addition to this 40% reduction in color inventory, substantial savings were effected without changing the furnish in sixteen matching operations. The savings averaged $5.50 a ton, with a top of $14.00 per ton in two cases.

Obviously each problem connected with the use of dyes presents its own particular difficulties. Yet our Technical Service Staff has been able to help materially in thousands of cases—to obtain better results, reduce costs or both. Their service is available to any user of dyes without cost or obligation. Just write or wire our main office or nearest branch office, and a member of our Technical Service Staff will be sent promptly to talk over your problems with you.

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A DIVISION OF AMERICAN CYANAMID COMPANY

ELIMINATE • REJECTS

this easy, inexpensive way

● Use a LOBDELL ROLL CALIPER to keep systematic check on the condition of calender and press rolls. Save high cost of rejects traceable to improperly finished rolls.

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● It is comparatively light in weight and easily handled.

● The price is moderate; it can save many times its small cost within a single year.

● *It is well worth investigation.* Particularly, since your inquiry does not obligate you. Mail the coupon. Get the facts. Decide, at your leisure.

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Gentlemen:
Without obligation, send me the data on LOBDELL ROLL CALIPERS.

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TITLE _____

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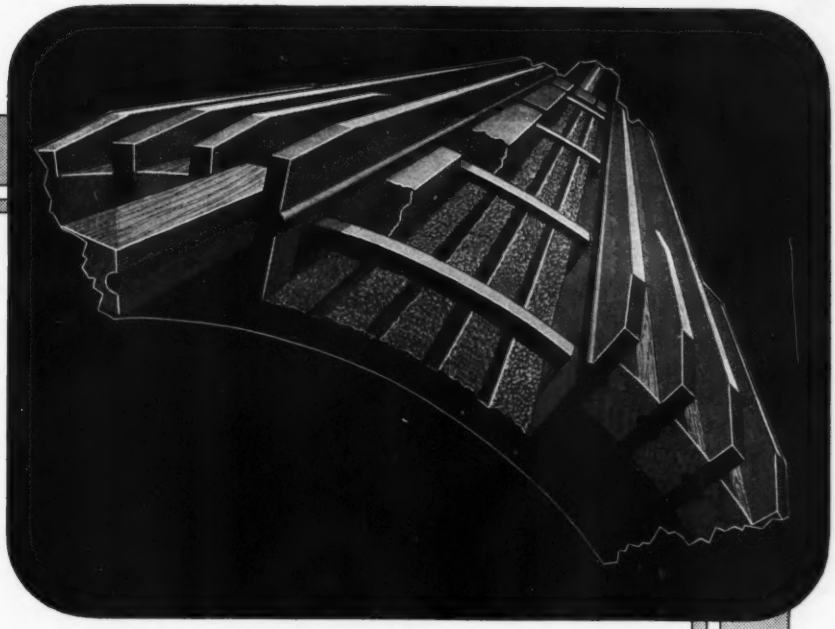
Many of the world's fastest newsprint machines are clothed with Orr Felts, which incidentally, are doing a magnificent job and stand up like the proverbial leathernecks.

Felts designed for such outstanding performances at high speeds typify the many other Orr weaves and naps required for the many Fourdrinier and cylinder machine grades now on the market.

Give Orr felts an opportunity to serve you. The line is complete . . . and there is a representative ready to serve you.

THE ORR FELT & BLANKET COMPANY
Piqua, Ohio.

Terrific punishment doesn't bother the Shartle X-66 plug



We've been saying it for several years and it is still true . . . the Shartle X-66 bandless plug is by far the strongest, roughest, and toughest plug on the market bar none. In less than two years, we've sold well onto a hundred . . . an unequalled sales record.

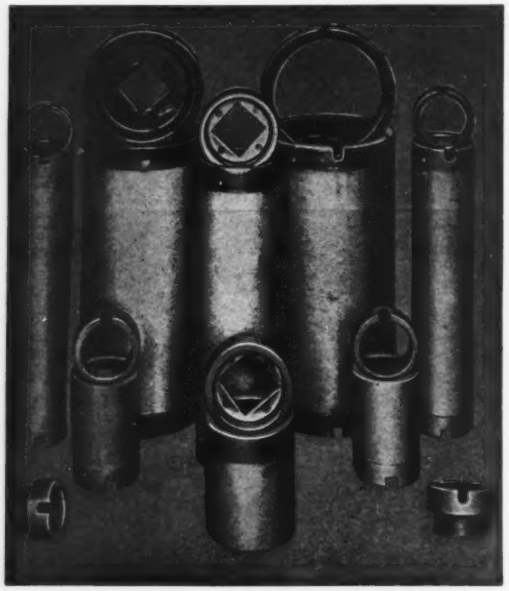
X-66 is really built. Its full length, metal side supports for the bars give double strength. By double, we're actually underestimating the case for there are 59.061 square inches of side support on both sides of each bar. That, as you can readily see, means the end of broken lugs.

Also note the beading of the bars and the grooving of the woods to correspond with the beads. These woods are of 2-year weather seasoned northern Indiana white oak and are driven in endwise between the bars. This makes for a construction of enormous rigidity . . . making it utterly impossible for the bars to tilt or the woods to rise.

Also notice the shape of the bars . . . not wedge shaped as in other plugs . . . but of uniform thickness their full height. That means just one thing . . . the same brushing or cutting face is always in service no matter how far the bars have worn down. Twice the life is the result . . . a result easily translated in terms of extra service.

The Shartle X-66 plug is available for all types, makes, and sizes of jordans and with bars of two or three lengths as preferred. Bars are of steel, bronze, or stainless steel. Send in that order for an X-66 the next time you want real plug performance. Shartle Brothers, Middletown, O. Division of the Black-Clawson Company.

SHARTLE BROTHERS



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CAPS — Long draw protected slot caps of heavy gauge steel in all standard sizes.

CAPS — Heavy duty caps with reenforced square hole. This new patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted.

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

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GOOD ADVICE

Your Product will be improved by using TENAX FELTS on *ALL* your machines, because . . . Into TENAX FELTS go Finest Materials in correct combinations, which, along with our years of experience in making papermakers felts, give you the best assurance of perfect performance.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY

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"BEDDING DOWN"

500,000 TONS OF PURE SULPHUR

Daily over 3000 tons of liquid Sulphur flow from the mines of the Texas Gulf Sulphur Company. It is carefully spread in thin layers over an area of 240,000 sq. ft. and allowed to cool and solidify. The result is a block of solid Sulphur . . . a vat 160 ft. wide, 1200 ft. long and 50 ft. high. A total mass of 500,000 long tons of gleaming yellow Sulphur . . . a mass which by its shape and size dramatically recalls to mind that here is one of the foundation stones of chemical industry!

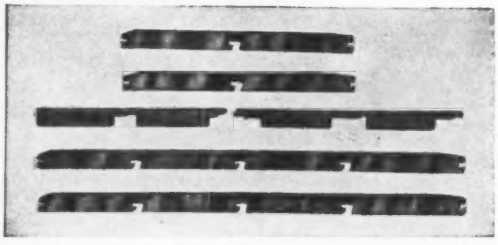
Sulphur is a versatile element. It aids in the conversion of forests to cellulose —the raw material of the paper industry. It aids also in the conversion of cellulose into rayon and plastics.

The Texas Gulf Sulphur Company has ready for shipments to its many customers not one but several of these large vats of Sulphur. Here is a dependable supply! A uniform product free from arsenic, selenium and tellurium!

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

JORDAN ENGINE FILLINGS

ALL SIZES METALS



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SOUND INVESTMENT

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PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

Published Every Thursday by the LOCKWOOD TRADE JOURNAL CO., Inc.

Executive and Editorial Offices: 15 West 47th Street, N. Y. C.
Western Rep.—H. K. Vinton, 123 W. Madison St., Chicago, Ill.

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The PAPER TRADE JOURNAL is indexed in Industrial Arts Index

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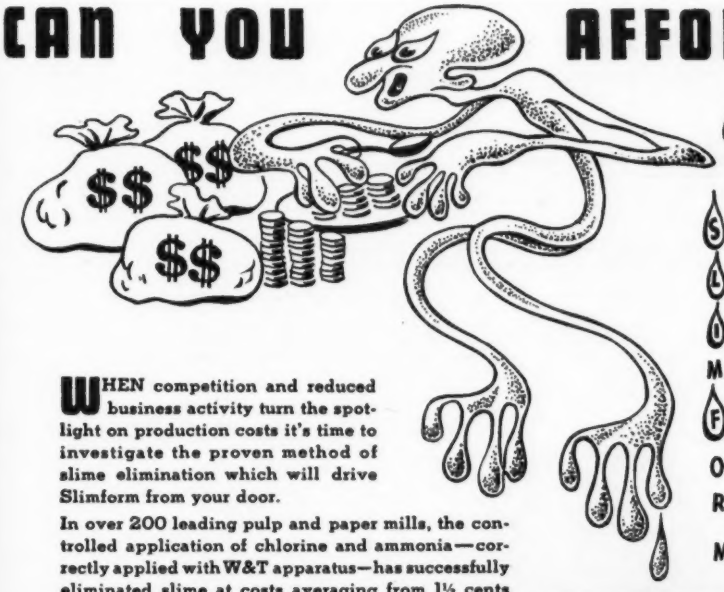
CAN YOU AFFORD TO FEED Slimform?



WHEN competition and reduced business activity turn the spotlight on production costs it's time to investigate the proven method of slime elimination which will drive Slimform from your door.

In over 200 leading pulp and paper mills, the controlled application of chlorine and ammonia—correctly applied with W&T apparatus—has successfully eliminated slime at costs averaging from 1½ cents to 6 cents per ton of product.

In your mill too, Slimform can be banished—slime losses turned into profits.

The story is told in Research Publication #327 "Slime in Paper Mills—Its Origin and Prevention." A request on your letterhead brings you a copy without obligation.

Stock losses—bacterial decomposition and reworking of stock

Lowered Quality—slime spots—pin hole—objectionable odors

Increased Costs—in water, heat, labor, chemicals

Maintenance Troubles—blinded wires—plugged felts

Frequent Clean-ups—slime breaks, poor sheet formation

Obstruction of Lines—stock and white water lines

Recirculation Difficulties—slime growths in recirculated systems

Mechanical Strain on felts and wires—shortened useful felt and wire life

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Manufacturers of Chlorine and Ammonia Control Apparatus

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PAPER TRADE JOURNAL

Reg. U. S. Pat. Off.

SIXTY-SIXTH YEAR

PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with PAPER TRADE JOURNAL.

Vol. CVI, No. 19

Thursday, May 12, 1938

PAPER

Established Sept. 21, 1910
Consolidated Feb. 19, 1925
with PAPER TRADE JOURNAL.

To Build $2,000,000 Cigarette Paper Mill

Ecusta Paper Corp. Will Erect Four-Machine Plant At Brevard, N. C., Which Has Desirable Water and Other Favorable Factors. — Proposed Plant To Employ 300-400 Hands; Will Start Operations Early In 1939.

[FROM OUR REGULAR CORRESPONDENT]

BREVARD, N. C., May 10, 1938.—Ecusta Paper Corporation has acquired approximately two hundred acres on the Davidson River, Brevard Township, Transylvania County, North Carolina, near the Pisgah Forest Reservation, on which it will erect a plant for the manufacture of cigarette paper. The plant will contain four cigarette paper machines and will cost approximately $2,000,000. It is expected to start operations early in 1939. The entire project will be under the personal supervision of Harry H. Straus, the corporation's president.

The site was selected after a consideration of many possible locations and after a study of all factors involved, extending over the better part of a year. Here were found the best conditions for a plant of this type, including an abundant quantity of virgin mountain water of the purest quality, so essential in the manufacture of cigarette paper.

Many Months of Investigation

For many months investigations have been conducted by interests closely identified with the cigarette paper industry looking to the construction in this country of a large cigarette paper mill of the most modern design. The purpose of the new plant will be to produce from American raw materials the same high grade cigarette paper as is at present imported from France.

Experiments have been carried on for a number of years in employing such American raw materials in the manufacture of this high type cigarette paper. These efforts have recently been crowned with success so that the sponsors of this venture have decided to build their plant.

The work, which has so far been carried on, has been followed with care and attention by several of the largest manufacturers of cigarettes in the United States.

Tests Prove Successful

Cigarette paper produced on commercial scales in French mills from American raw materials has been tested by the American cigarette manufacturers. This paper has it is stated, in every way proved successful and equal to the best French cigarette papers. Leading American cigarette manufacturers have expressed their entire satisfaction and have indicated their willingness to become substantial customers of the new mill.

Most Modern Plant of Its Kind

The mill when completed will, it is said, be the most up-to-date and modern of the kind anywhere.

The necessary funds have all been provided privately and there will be no offering of securities of any kind.

Associated in the Ecusta Paper Corporation are interests connected with Papeteries Rene Bollore of Odet and Cascadec, France, and Papeteries de Champagne of Troyes, France. Both these companies are leaders in their field, have been manufacturing cigarette papers for over a hundred years, and their products are well known and largely used in this country.

Proper Materials and Men

Through this combination, Ecusta Paper Corporation has at its disposal not only the well established formulae of French cigarette paper as used for many years by the old established Champagne and Bollore mills, but in addition will be benefited by the experienced aid of French technicians of the highest standing, and will be in a position to add American ingenuity, skill and production methods to the experience of French cigarette paper manufacturers. As a result of this combination of talent and experience, the usual period of trial and error will it is expected be avoided, and the new plant will be able, from the beginning, to duplicate the type and character of excellent French cigarette paper which has become so well established and popular in this country.

300 to 400 Persons

When the mill is in operation it will give steady employment to between 300 to 400 persons who will be employed locally and will be trained in the technical details of this high type of paper. There are no substantial seasonal variations in either the production or demand for cigarette paper and once in operation it is expected that the plant will run continuously.

Forester Urges Pulpwood For Idle Lands

F. G. Kilp of Nekoosa-Edwards Co. Advocates Conversion of Unproductive Acres Into Pulp Wood Reserves—Paper Rug Manufacturers Busy—Kimberly-Clark Employees Meet on Safety Program—Late Mill News.

APPLETON, Wis., May 9, 1938.—Converting of idle lands into pulp wood reserves was advocated last week by F. G. Kilp, forester for the Nekoosa-Edwards Paper Company, Port Edwards, Wis., in an address to the Wood County board of supervisors. He urged adoption of a program which would link forestry with the supply of pulp wood on which the paper industry depends.

With the paper industry facing keen competition from southern mills, Mr. Kilp pointed out that it is necessary to log 35,000 acres to supply 260,000 cords annually to the mills in Wood County. At the present time only 13,300 acres of wild land are designated for forest crops, and the urgency of a forest program is evident, he said.

F. G. Trenk, state extension forester, also was present at the meeting to explain the relation of state conservation laws to such a project.

Paper Rug Manufacturers Busy

With its national advertising appropriation tripled and more salesmen added, the Deltox Rug Company of Oshkosh, Wis., is defying depression in building up a bigger demand for the fiber rugs it has manufactured for the last fifteen years, made from heavy paper stock produced in Wisconsin and Michigan mills. Operations are practically at capacity, according to Carl Steiger, president.

Colored paper stock is being used, made from wood pulp especially screened so the fibers run the long way of the paper. Machines cut it into ribbons, wind it onto spools, and the ribbons are twisted into "yarn" to be wound on loom spools. The woven design of the rugs is produced by combinations of colors on the looms. Painted designs are stencilled on many of them.

Paper rugs have been found by consumers to outwear wool rugs, and the present demand is 35 per cent for products used all year around in the household. The remaining 65 per cent comes from usage for summer homes and porches.

Kimberly-Clark Employes Meet in Safety Program

Employees of the Kimberly-Clark Corporation's mill at Kimberly, Wis., devoted an entire day on Thursday, May 5, to its annual safety program, making it a community event covering all phases of safety. The mill clubhouse was fixed up with booths prepared by various mill departments showing examples of safety. Numerous prizes were given in contests.

H. G. Boon, general superintendent, was one of the speakers at the morning session on "Management's Part in Safety." He said there must be a constant re-emphasis on safety if it is to be successful. Adequate safeguards for machinery, absence of junk and litter, proper training in new processes and adequate leadership and supervision must be furnished by the management. Physical examinations and job analysis are also part of the program, he said, because management feels its responsibility to do everything within its power to keep the safety movement effective.

F. J. Sensenbrenner Speaks at Banquet

In the absence of Gov. Philip F. La Follette, who was ill, the principal address at a banquet held at the clubhouse in the evening was given by F. J. Sensenbrenner, president of the company. He gave the mill workers an analysis of the factors leading to business depression and the effect of one legislative experiment after another in retarding recovery because of the manner in which they interfere with orderly business processes. He pointed out, however, that despite the drop in business in various industries, Kimberly-Clark Corporation has operated at nearly 100 per cent since 1933, with the exception of one machine at Niagara Falls, N. Y., and several machines in other mills down for a short time while being rebuilt. The company's policy, he said, embraces mutual confidence, good products at reasonable prices, and cooperation of employees to obtain capacity production without impairment of quality. "With continued cooperation I am confident we can hold our own," he said.

Ernst Mahler, executive vice-president, spoke on the importance of harmonious relations between management and the employee, and Cola G. Parker, vice-president, on the wisdom of trying new things in national life by using tried methods rather than the untried. A talk also was given by S. F. Shattuck, vice-president, in which he said team work was responsible for the Kimberly-Clark mills operating continuously in spite of national laws and turbulent times while many others are averaging three and four days a week. H. A. Klemm, of the Wisconsin Industrial Commission, Madison, Wis., was present and made the statement the safety conference and exhibits were a worth while example for other industries to follow.

Consolidated Signs Annual Union Contract

Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., signed its twentieth annual contract last week with unions affiliated with the American Federation of Labor. Officials said there were no important changes in the terms of the contract. The general wage scale remains the same except for several increases in departments where added responsibility has resulted from installation of new equipment.

Sessions were held for three days in the conference room at the company's main office. George W. Mead, president, and Stanton W. Mead, treasurer, gave brief talks at the opening of the conference. Company representatives in the negotiations were Leo J. Barrette, general employment manager, C. E. Jackson, mill manager of the Wisconsin Rapids division; Warren Beadle, Jr., manager of the Biron mill, H. J. Adrian, manager of the Stevens Point mill, and C. K. Boyer, manager of the Appleton mill.

Among the union representatives were: A. J. Hayes, Washington, D. C., of the International Association of Machinists; James Creed, Kalamazoo, Mich., International Brotherhood of Papermakers; Raymond Richards, Wisconsin Rapids, Wis., International Brotherhood of Pulp, Sulphite and Paper Mill Workers, and Alex Bandelin, Wisconsin Rapids, International Brotherhood of Electrical Workers. Each local union also had a representative present.

Employment in Paper and Pulp Industry

Employment in the paper and pulp industry of Wisconsin has shown very little decline in seven months since the business recession set in, according to reports compiled from 35 of the larger mills by the Wisconsin Industrial Commission at Madison, Wis.

In September, 1937, the number of wage earners was 16,500. In November it dropped to 16,300, in December to 16,200, and in January to 16,100, and remained at the latter figure in February and March. Weekly payrolls dipped for a time but began to climb. They were as follows: September, $420,000; October, $429,000; November, $410,000; December, $396,000; January, $397,000; February, $418,000, and March, $417,000.

March showed the largest total of weekly hours, with the figures as follows: September, 650,000; October, 668,000; November, 647,000; December, 633,000; January, 633,000; February, 669,000, and March, 670,000.

The tables do not include managerial, supervisory, technical and clerical employees.

English Paper Executive Visits Wisconsin

Edgar L. Fifoot, sales director for Bowater-Lloyd Company, Limited, London, Mrs. Fifoot and their daughter Beryl, were guests last week of George W. Mead, president of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis. This company has leased the patents for Consolidated's Process Coated papers and has rebuilt some of its machines to apply the coating process directly on the machines.

Mr. Fifoot's concern is the largest paper manufacturing enterprise in Europe, a recent amalgamation of two large English companies. It operates five mills in England, and contemplates installation soon of a machine similar to the new No. 5 machine of the Consolidated mill, built especially for process coating. On inspecting the Consolidated machine, he said there was nothing comparable to it in Europe. The Kemsley mill, however, operates the largest news print machine in the world, producing a 310-inch sheet, and turning out upwards of 650,000 tons a year.

N. E. Paper Merchants to Hold Outing

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., May 9, 1938.—The outing of the New England Paper Merchants Association is to be held May 16 at the Rhode Island Country Club, Barrington, R. I. Features of the affair will include golf and other sports and a dinner, with a brief business session, in the evening. James C. Campbell, president of the Industrial Paper and Cordage Company, Pawtucket, R. I., is committee chairman.

To Open Comeau Bay Mill June 11

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., May 9, 1938.—The giant new newsprint mill of the Ontario Paper Company at Comeau Bay, Que., which has been in production for some little time, will be formally opened at inauguration ceremonies to take place on June 11. Expected to be present at the function are Lord Tweedsmuir, Governor General of Canada, Hon. E. L. Patenaude, Lieutenant Governor, Hon. Maurice Duplessis, Premier of Quebec and other ministers of the provincial government.

It is also hoped that His Eminence Cardinal Villeneuve may find time to pay a visit to the town which means so much to the North Shore.

Invitations will be issued shortly to representatives of the industrial, commercial and financial life of Canada, and to representative members of public bodies interested in such developments.

The Ontario Paper Company development at Baie Comeau started in 1926, when power production work began on the Riviere des Outardes. Construction of the newsprint mill started two years ago, employing up until the present thousands of men in this and allied operations. Newsprint production, already begun will shortly be increased. The company does not have to compete in the competitive commercial markets, since all its production will go to the New York News, with which the interests that have created the Baie Comeau development are affiliated.

A. R. Jackson, Sec. Wrapping Division

A. H. Chamberlain, executive secretary of the National Paper Trade Association, 220 East 42nd street, New York, has just sent out the following statement:—

We take pleasure in announcing the engagement of Mr. A. R. Jackson as Secretary for the Wrapping Paper Division. He has moved to New York and is already established at this office.

Mr. Jackson has a wide acquaintance among distributors as well as manufacturers of Wrapping Paper lines and is familiar with their mutual problems, individual policies and methods of operation. His entire business career has been with Nekoosa-Edwards Paper Company, advancing to the position of Manager of Sales which he occupied for a number of years, resigning not long ago to take a complete rest.

It is the feeling of your executives that Mr. Jackson is exceptionally qualified by his experience, standing and personality to serve and represent the members of the Wrapping Paper Division and promote their interests. His many friends will welcome him to our organization and will be confident of his success in increasing its prestige and influence. We bespeak for him the good wishes and cordial cooperation of every member.

Northwest Paper in New Quarters

The Northwest Paper Company moved this week to its new quarters in the Civic Opera Building at 20 North Wacker Drive. The Chicago distributing office for the Minnesota manufacturers was formerly at 332 S. Michigan Avenue. Telephone numbers of the new office are State 2337-2338-2339 and 2340.

Large Stocks Confuse Newsprint Situation

Canadian Manufacturers View Consumption Outlook With Concern as Demand For First Quarter Shows Negligible Reduction of Mill Inventories—Producers May Confer to Discuss Problem—Situation in England.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., May 9, 1938.—The decision by the Great Northern Paper Company to continue the $48 level for newsprint throughout the year has been a subject of discussion in newsprint circles here, but so far there has been no indication of any change in the $50 level established by Canadian mills and supported by the majority of producers in the United States. In fact, there is every evidence that, barring unforeseen circumstances, that price will be maintained for the balance of the year.

With respect to consumption, however, the situation is none too encouraging. Newsprint statistics for the first quarter of this year show quite a negligible reduction in the heavy excess stocks of newsprint reported at the end of 1937. Publishers' stocks have declined, but with consumption continuing to fall off, amount of these stocks have merely been transferred to the producers, and the net marketing change has been practically nil. One result is that International Paper has announced it will operate on a 4-day-a-week basis, while the St. Lawrence has established a 4½-day week.

A further complication has been the coming into production of the Ontario Paper Company's mill at Comeau Bay, with a capacity of 300 tons of newsprint per day.

Manufacturers May Discuss Situation

It is now reported that a conference of newsprint manufacturers, at which would be discussed several of the industry's more important problems, may shortly be held in Quebec City. Manufacturers from Ontario and Quebec will be present, if such a meeting is called, and while the provinces of New Brunswick and Nova Scotia may or may not be represented it is felt that the existing links between the industries in the several provinces would indicate that any decisions on any important matter taken by the two major provinces would undoubtedly be followed in the Maritimes.

Newsprint Situation Similar in England

A dispatch from London shows that conditions similar to those in Canada prevail in England. According to John Cowley, chairman of the Daily Mirror Newspapers, Limited, speaking at the annual meeting of shareholders, newsprint manufacturers could easily produce 30 per cent more paper than publishers are consuming at the present time.

Daily Mirror Newspapers has a substantial investment in the Albert E. Reid & Company Anglo-Canadian Pulp and Paper Mills, and to a lesser degree, in the Anglo-Newfoundland Development Company. Consequently the opinion of Mr. Cowley as a manufacturer-publisher, is of more than passing interest.

English Manufacturer on Newsprint Outlook

In regard to the newsprint outlook, Mr. Cowley said to the shareholders:

"No one has been more astonished at the dramatic change in what has overtaken this branch of industry, than I, who have watched the progress of newspapers and newsprint for very many years. This is due largely to the ever-growing fear in every part of the world of European complications—and, secondly, to the recession of trade in the United States. The paper-making industry in this country and also in Canada and the United States has been steadily set back. For the past six months the setback has continued, and still continues.

"This time last year there was a fear in the mind of every newspaper publisher in this country and in America that not only would the price of newsprint be continually increasing, but also, that there would not be sufficient paper to supply the requirements of many of them. There is now little fear of the price of newsprint paper becoming dearer for some time to come, and the manufacturers could easily produce 30 per cent more than the newspaper publishers are consuming at the present time—a totally different position from that of only 12 months ago."

R. T. Cullen Says Trend Is Upward

[FROM OUR REGULAR CORRESPONDENT]

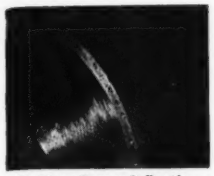
BOSTON, Mass., May 9, 1938—At the annual meeting of stockholders of International Paper and Power Company, Richard J. Cullen, president, stated that operations during the first quarter of the year were at only 50 per cent of capacity. Operations are continuing at that rate, he said, but are showing some upward trend.

"I am extremely confident," Mr. Cullen stated, "that the company can capitalize on any improvement in general business. The mills, plants and equipment are in the best condition that they have ever been in and I am hoping that we will see some signs of improvement in the third or fourth quarter."

Replying to a stockholder's question as to why the company paid a substantial undistributed profits tax instead of the full preferred dividends, Mr. Cullen stated: "Last year when preferred dividends were held out as a probability we were hopeful of continuing earnings at the rate then in effect. In the last quarter of 1937, however, we ran into a very severe slump in business and it was the best judgment of the directors that we should not pay out more than half of the year's dividends, and we, therefore, had to pay an undistributed profits tax of slightly over $400,000.

"Payment of this tax enabled us to make a net saving of $2,100,000 in cash distribution. We are very hopeful of a change in general business which will permit substantial earnings by the company, but our business cannot become profitable until the general business trend is upward."

"The paper business is one of the large industries that picks up before other lines," Mr. Cullen stated. "It feels the benefit of any change, particularly upward, before any other industry. It is possible for it to change in 30 days so that it is on a very profitable basis."



Rubber-Covered Suction Roll

High-Speed Shake

Hypoid Bevel Gear Drive

Silent Chain Dryer Drive

Balanced, Oilless Steam Joints

Hi Speed Dryer Condensate Remover

Automatic Winder and Roll Unloader

You Pay *for these* Improvements whether you use them or not

During the many recent hearings at Washington experts have testified that nearly one-third of all paper in this country is made on obsolete machines.

With wages and hours definitely set, the only way to make additional profits is through the operation of your machines. Use of less power to perform the same job, consumption of less oil and materials, elimination of undue break losses, lower clothing costs, production of better paper, speeding up of production—these are but a few of the many items that MODERN Beloit machinery can help to correct very definitely.

Thus, when you are not taking advantage of the Beloit improvements that are known and available to you for lowering your costs—your profits are just so much less—and whether you use these improvements or not, you actually are paying for them. The difference that you would save would soon pay for the new and improved equipment.

These facts have been established frequently in our contacts with mills and can be proved to you conclusively.

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BELOIT

Beloit Iron Works, Beloit, Wis., U.S.A. Founded 1858

Creditors of Lake Sulphite Pulp Co. Meet

Provisional Liquidator States It is Essential For All Creditors and Stockholders to Cooperate in Difficult Situation—Total Liabilities of Lake Sulphite Co. Placed at $4,250,000—Other Late Mill News—Lumbermen Meet

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., May 10, 1938.—A largely attended meeting of the creditors of the Lake Sulphite Pulp Company, Limited, Red Rock, Ont., which went into liquidation several weeks ago, was held at Osgoode Hall, Toronto, on May 6. Provisional liquidator, D. McK. McClelland was appointed permanent liquidator. He stated that he had recently inspected the plant and equipment at Red Rock and that it was essential for note holders, stockholders and creditors to cooperate to the fullest extent in order to save a difficult situation.

The total liabilities are placed at $4,250,000 without giving any consideration to the substantial additional amounts which will have to be provided for the completion of the project. The liabilities as summarized by the report of the liquidator are,—ten year, 6 per cent convertible notes, $1,250,000; other liabilities, secured in whole or in part, $2,200,000; unsecured liabilities, $800,000. This is exclusive of $120,000 in wages and salaries owing as of February 7 and paid by receiver or liabilities assumed by receiver under court authority. Additional liabilities not estimated were listed—workmen's compensation assessment due the province of Ontario in respect of wages and salaries to February 7, 1938; corporation taxes payable to the province in 1938 on capital, and business and stumpage charges due the province on wood cut during the 1937-38 season.

Liens Filed Against the Property

Forty-five mechanics' liens totaling $845,000 had been registered against the property. Lien holders had agreed to postpone action to be recommended only on reasonable notice.

Mr. McClelland reported to the court that his investigation into the affairs of the company will be completed in the near future after which he will be in a position to consider several preliminary plans which have been put forward by those interested in the company for the completion of the plant and launching operations.

Inspectors were appointed to confer periodically on the affairs of the Lake Sulphite Pulp Company and the court accepted nomination from creditors and stockholder groups. E. I. Jenkins of the Canadian General Electric Company, and C. M. Salisbury, of the Canadian Westinghouse Company, were nominated by representatives of the secured creditors; C. P. Wadge, of Canadian Packers, and Eric Willis, of the Canadian Credit Men's Trust Association, will represent the unsecured creditors while Neil C. Polson, of Montreal, and G. S. Burden, of Montreal, represent the common stockholders.

It is reported that it may not be necessary to place all projected units in operation at once. Hence the R. O. Sweezey estimate at $10,000,000 for completed project may be cut down appreciably while the $6,000,000 estimate made earlier by John Stadler is recognized as much too low. Any proposals for the completion of the plant and putting it in operation are indefinite yet and it will likely be some time before shareholders will have much idea of what they can salvage from the ill-fated undertaking, which was launched with such high hopes when the price of pulp was at a very high figure.

Gerald Staunton Elected Chairman

Gerald Staunton, vice-president of Stauntons, Limited, Leaside, Ont., wall paper manufacturers, was elected Chairman of the Ontario Division of the Canadian Manufacturers Association at the annual meeting of the Division held in Hamilton, Stauntons are planning the construction of an addition of 14,000 square feet to their factory which is one of the most modern on the continent. The plant was completed only a year ago at a cost of $350,000.

Protest Pulpwood Drive in Nipigon

A protest meeting in connection with the drive of pulpwood down the Nipigon River in Northwestern Ontario will shortly be held. Members of the Fish and Game Association declare that the proposed drive of 60,000 cords of pulpwood down the Nipigon this year would ruin the finest trout stream in the world. By the construction of a channel from the Nipigon to a nearby small lake, the pulpwood could be diverted from the river proper for eight miles, returning to the river through a small tributary in Lake Superior.

General Timber Co. Moves Office

The head office of the General Timber Company has been moved from Toronto to Port Arthur, Ont. A. L. Johnson is the president and H. B. Sheppard, secretary. The company is operating in the vicinity of Heron Bay and has agreements with the Marathon Paper Co., of Wisconsin, which may bring about the establishment, when markets appear satisfactory, of a pulp producing plant in the district of Heron Bay.

B. F. Avery Gives Address on Forest Conservation

B. F. Avery, woods superintendent of the Great Lakes Paper Company, Fort William, Ont., gave an instructive address on May 4 on "Forest Conservation" before the Port Arthur Chamber of Commerce.

Lumbermen's Safety Assn. Meeting

At a meeting of the Lumbermen's Safety Association, held lately in Port Arthur, Malcolm Cochran, of the Hammermill Paper Company, presided and about thirty pulpwood and timber companies were represented. Improvement of medical service to employees in camps was discussed. Establishment of infirmary hospitals in camps was tried by three operators as an experiment last year and it was reported reduced the cost of accidents fifty per cent.

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EBG Liquid Chlorine
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Wrapping Paper Distribution During 1937

L. S. Bishop of Paper Trade Association of Philadelphia Presents Survey Conducted By Statistical Research Division of The National Paper Trade Association — Paper Mill Superintendents Meeting in New Jersey.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., May 9, 1938.—The Dollar and Sense Club, recently organized by outstanding wrapping paper merchants here, entertained members of the Paper Trade Association of Philadelphia at dinner on Thursday evening of last week, with T. H. B. Smythe, president, presiding. While this is comparatively a newly organized club, it boasts of a membership totaling thirty, the most recent addition being The Gallen Paper Company, 739 North 24th street. The lucky winner of the dinner prize was Hyder Paper Company. Among those who spoke was W. B. Killhouer, president of the Paper Trade Association of Philadelphia. He stressed the achievements of the Educational Course conducted by the Association, and said that this past year was the first time representatives of wrapping paper houses were enrolled, adding that it has attracted national attention.

L. S. Bishop Gives Facts on Wrapping Paper

LeRoy S. Bishop of Raymond and McNutt, treasurer of the Paper Trade Association of Philadelphia, presented a survey of Facts About Wrapping Paper Distribution in 1937, conducted by the Statistical Research Division of The National Paper Trade Association, accompanied by nine slides. Chart 1 represented the dollar sales volume of the wrapping paper division, and covered the prosperous period before the depression in 1928 as well as the depression itself, and more lately the so-called "recession" which started about the middle of last year and is now reflected in most trades and industries, and emphasizing the fact that the paper business closely follows general business and that no boom is likely to take place in the paper business without prosperity returning first to general business. Chart 2 depicts the division of business for the last five years covering the years 1933 to 1937, and is particularly significant because it shows a decided increase in the ratio of direct sales to total sales and a corresponding decline in the ratio of warehouse sales to total sales.

Gross Trading Margin on Sales

Chart 3 showed the gross trading margin on sales for the last five years and is the most important chart for wrapping paper merchants. It is noted in that chart that the gross trading margin in 1937 is more than 23 per cent lower than in the year 1933. Chart 4 is a tribute to the efficiency of wrapping paper merchants, setting forth that economies in distribution made possible by increased sales volume cut the costs of distribution in the year 1937 almost 30 per cent lower in percentage on sales than in 1933. Chart 5 showed net operating profits in percentage on sales for the last four years, and although there were considerably higher sales in the year 1937 than in any of the preceding three years, it is noted that the percentage of net operating profit is lower than in the other years. With taxes rising and with labor costs high, a decline in sales volume, brought about by the present recession might quickly wipe out the small net operating profit of 1.46½ for the year 1937. Chart 6 illustrates what took place on the average warehouse, indirect and direct order. On the warehouse order only 0.59 per cent is shown as net operating profit.

Indirect and Direct Sales

It was noted that the indirect sale results in the largest percentage of net operating profit on Chart 2, however, showed that the volume done on indirect sales in the last five years had varied between a high of only 16.09 per cent and a low of 10.40 per cent of the total sales. The direct sale also returns considerably more profit in percentage than the warehouse sale. As a matter of fact, the actual dollars of net operating profit brought about through the transaction of direct sales are almost twice as much as the dollars obtained through warehouse sales.

Chart 7 showed the financial gains and losses other than strictly operating ones, and pointed out that practically nothing (only 0.06 per cent) accrues to wrapper merchants because of an advantage in discount. The discount customers take almost balances the discounts which mills allow.

Net Profit for Last Four Years

In Charts 8 and 9, as in Chart 7 the financial status of the wrapping paper was dealt with. Chart 8 showing the final net profit for the last four years, and setting forth the fact that with the exception of the year 1934, 1937 was lower in final net profit than any other year, despite the fact that business generally made more profit during that year than it did since the depression started in 1929. Chart 9 passes from the operating side of the wrapping paper business to the question of net worth and the return thereon.

State, County and Local Taxes

The last feature touched upon by Mr. Bishop was Taxation. He called attention to the fact that the number of taxes varies with the State, county and municipality where individual merchants are located, and in one year the percentage of income before taxes which is paid as taxes has risen 2.83 per cent from 29.55 per cent to 32.38 per cent. Expressed as a percentage on sales, taxes increased in 1937 over 1936 by .39 per cent—from 0.84 per cent to 1.23 per cent. Taxes during 1937 cost more than either warehouse storage, warehouse, handling, cartage and delivery, or inside selling. If the present recession were to continue, it is not at all unlikely that taxes will be the determining factor in placing a large percentage of merchants in the red.

Paper Mill Superintendents Division Meeting

The Pennsylvania-New Jersey-Delaware Division of the American Pulp and Paper Mill Superinten-

(Continued on page 52)

Financial News of Pulp and Paper Industry

Report of Southern Kraft Corp. for 1937 Shows Net Profits of $6,545,293 for Year — Sherman Paper Co. Assets Appraised at $358,164 — International of Newfoundland Reports Net Loss — Other Financial News.

NEW YORK STOCK EXCHANGE

High, Low and Last for the Week Ending May 11, 1938

	High	Low	Last
Armstrong Cork Co.	31½	29½	30
Celotex Corp.	19	19	19
Celotex Corp., pf.	60	60	60
Certain-Teed Products Corp.	7¼	6⅜	6⅞
Certain-Teed Products Corp., pf.	28	25⅜	27½
Champion Paper & Fibre Co.	21	18¾	20⅜
Champion Paper & Fibre Co., pf.	99	99	99
Congoleum-Nairn Co.	21½	19½	21¼
Container Corp. of America	12⅛	11⅜	12
Continental-Diamond Fibre Co.	7⅜	6½	7⅜
Crown-Zellerbach Co.	10⅜	9¼	10¼
Crown-Zellerbach Co., pf.	70	70	70
Flintkote Co.	16⅞	15½	16½
Robert Gair	3⅞	3⅜	3⅞
Robert Gair, pf.	12½	11⅜	12½
International Paper & Power	8¼	6⅞	8
International Paper & Power, pf.	32½	27	31½
Johns-Manville Corp.	75	67	74⅜
Johns-Manville Corp., pf.	125½	125	125½
Kimberly-Clark Corp.	22½	22	22½
Masonite Corp.	32	30	32
Mead Corp.	11⅛	9¾	11
Mead Corp., pf.	55	55	55
Paraffine Companies, Inc.	36	34½	36
Ruberoid Co.	20¾	18	20¾
Scott Paper Co.	41	39¾	40½
Sutherland Paper Co.	24	21¼	24
Union Bag & Paper Corp.	10⅝	9⅞	10½
United Paperboard Co.	4¾	4¼	4⅜
U. S. Gypsum Co.	78	71	75
U. S. Gypsum Co., pf.	165	165	165

NEW YORK CURB EXCHANGE

High, Low and Last for the Week Ending May 11, 1938

	High	Low	Last
American Box Board Co.	8½	7½	8½
Brown Co., pf.	25	19⅛	25
St. Regis Paper Co.	3½	2⅞	3⅜
St. Regis Paper Co., pf.	52¾	50	51½
Taggart Corp.	4⅜	4⅛	4¼

Sherman Paper Co. Assets $358.164

[FROM OUR REGULAR CORRESPONDENT]

GREAT BEND, N. Y., May 11, 1938.—An appraisal filed this week with Judge Conboy revealed the liquid assets at other facilities of the banqrupt Sherman Paper Company valued at $358,164.13. These figures include the mill properties at Great Bend, Felts Mills and Lefebvre besides its timberlands, as well as cash and other liquid assets. When the bankruptcy schedules were filed with the Federal court at Utica the assets were listed at $992,553 and liabilities at $739,568.18. Now that the appraisal is completed the properties will probably be sold at auction unless a purchaser is found. It was said here that a number of prospective buyers have inspected the properties and in the event there is immediate possibility of a satisfactory sale no auction will be arranged nor an effort made at foreclosure of mortgages. The appraisers of the properties were Corwin T. Jewell, J. Lawrence Conboy and Fred L. Jones.

I. P. of Newfoundland Shows Loss

International Power and Paper Company of Newfoundland, Ltd., reports as follows for 1937: Net loss, $35,451, compared with net loss of $364,179 in 1936. Net sales, $7,401,295, against $7,702,406; cost of sales and expenses, including charges for excess tonnage and after deducting miscellaneous income, $5,527,231, against $6,231,557.

Southern Kraft Earns $6,545,293

The Southern Kraft Corporation for 1937 reports that net profit after all charges but before dividends, was $6,545,293 compared with $5,657,470 for 1936; earned surplus as of Dec. 31, 1937, $1,258,079 against $703,997 as of Jan. 1, 1937, gross income, $44,948,964 compared with $33,954,357.

The statement of profits and loss and earned surplus of the company for the year 1937 was as follows:

Sales and Other Income:			
Gross sales, less returns, allowances and discounts—			
Customers	$42,981,652.95		
Affiliated companies	1,928,499.79	$44,910,152.74	
Other income—net		38,811.40	$44,948,964.14
Cost and Expenses:			
Cost of sales—			
Pulpwood, labor, materials, etc.		$22,534,945.04	
Maintenance and repairs		3,096,593.80	
Taxes (other than income taxes)		735,394.18	
Outward freight and delivery expenses		5,271,885.32	
Selling, general and administrative expenses		1,772,581.22	
Provision for doubtful accounts		279,979.58	33,691,379.14
			$11,257,585.00
Deductions:			
Interest to public—			
Funded debt	$ 580,700.85		
Other—net	17,857.62	$ 598,558.47	
Interest to parent company—			
Funded debt	$ 70,625.03		
Income notes	1,035,110.16		
Other debt	125,737.57	1,231,472.76	
Amortization of debt discount and expense		147,126.11	
Depreciation		955,158.18	
Depletion		50,391.55	
Provision for Federal normal and state income taxes		1,633,918.80	
Provision for Federal undistributed profits tax		95,666.20	4,712,292.07
Net Profit for the Year			$ 6,545,292.93
Earned Surplus—January 1, 1937			703,997.29
			$ 7,249,290.22
Add:			
Profit on bonds redeemed during 1937		$ 18,011.25	
Miscellaneous credits		15,777.68	33,788.93
			$7,283,079.15
Deduct—Dividends paid			6,025,000.00
Earned Surplus—December 31, 1937			$ 1,258,079.15

Mayflower Pulp Co. Incorporates

AKRON, Ohio, May 10, 1938.—Incorporation of a new Akron firm, the Mayflower Pulp and Paper Company, was announced last week. Incorporators are Councilman Robert C. Ryder, Mrs. Bessie Reiter, 548 Crosby street, and William Frascella.

The firm will engage in jobbing of all kinds of paper and pulp for all uses, Mr. Ryder said. Manufacturing may be undertaken in the future.

The company has obtained a railroad frontage and warehouse at 245 Federal street. Operations will begin in about a month following arrival in Akron of Eastern men interested in the concern, he said. Business will be confined to the Akron district at first but later efforts will be made to expand it on a state-wide basis, Mr. Ryder said.

Manufacturers of Paper and Pulp Dishes Charged With Price Fixing

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 11, 1938.—Unlawful fixing of uniform prices and discounts, in violation of the Federal Trade Commission Act, is alleged by the Commission in a complaint issued against 17 manufacturers of paper, pulp and wooden dishes or trays used principally by groceries, delicatessen stores and meat markets as containers for food products.

Food Dish Associates Also Respondents

Food Dish Associates of America, an unincorporated trade association whose activities as such terminated in May, 1937, and its secretary and treasurer, Allan P. Durgin, also are respondents. During its existence, the trade association had its office at 285 Madison Ave., New York. The membership of the association was changed from time to time, but at certain times specified in the complaint it included the various respondents named therein.

The complaint charges that the respondents entered into agreements and understandings among themselves under which they fixed uniform, minimum sales prices and uniform discounts for their products, as well as the prices at which wholesalers, jobbers and other dealers were required to sell such products.

Respondents Named in Complaint

Respondent manufacturers named in the complaint are as follows: Champion No-Leak Paper Dish Company, 931 Brown avenue, Toledo, Ohio; Southern Champion Tray Company, Chattanooga; Keys Fiber Company, Waterville, Me.; Steele-Wallace Corporation, 2000 Hanley Road, Saint Louis; Berst-Forster-Dixfield Company, 1602 Graybar Building, New York; Stevens & Thompson Paper Company, North Hoosick, N. Y.; Oval Wood Dish Corporation, Tupper Lake, N. Y.; F. M. Longnecker, Delta, Ohio, trading as Paper Food Trays Company; Crescent Paper Dish Company, Inc., 505 Johnson street, Brooklyn; The Standard Carton Company, 2611 Pacific avenue, Tacoma, Wash.; The Paper Specialty Corporation, 9th and Irving streets, Portland, Ore.; St. Joe-Mullen Container Corporation, St. Joseph, Mich.; Paper Plate & Tray, Inc., 222 West Adams street, Chicago; Sanitary Container Corporation, 38 South Cruse street, Indianapolis; American Paper Specialty Manufacturing Company, Pittsburgh; Lincoln Box Company, Merrill, Wis.; and Newark Paper Company, 139 Plymouth street, Brooklyn.

John M. Hart Company, Graybar Building, New York, sales agent for Keyes Fiber Company, also is named as a respondent.

Food Dish Associates Formed in 1933

Food Dish Associates of America was formed in 1933, the complaint alleges, for the purpose of serving as a clearing house with the joint cooperation of its members, who, through such association, until early in 1937, and thereafter, until about March, 1937, through Allan P. Durgin, secretary of such association, engaged in attempts to stabilize and supervise production and distribution in their industry; to collect from and disseminate among the members, trade statistics, including the prices at which their products were being sold; to fix prices, and otherwise to promote the common business interests and joint welfare of the members for their mutual profit and advantage. In March, 1937, 11 of the respondent manufacturers allegedly solicited and received the active cooperation and services of another respondent, Gooch & Co., Inc., a New York concern which acted as intermediary in the furtherance of these same objectives and purposes.

Charges in the Complaint

The complaint charges that the respondents, with the active cooperation of the trade association, Durgin, and Gooch & Co., and pursuant to their understandings and agreements, engaged in the following practices in furthering their price-fixing combinations:

(1) Exchanged, through the medium of the trade association and its successors, price lists in order to establish the prices at which their respective products were to be sold; (2) fixed uniform prices at which their products were sold, and, at times, the discounts thereon; (3) required wholesalers, jobbers and other dealers to sell to ultimate consumers at uniform prices; (4) established a system of zones throughout the United States to aid in the fixing of prices; (5) agreed to give to each other prior notice of the fact that a sale was to be made at other than the established price; (6) collected and disseminated information concerning orders entered, production, shipments, unfilled orders on hand, inventories, prices at which dishes had been sold, costs, and production capacity of equipment of the industry.

Price Competition Prevented

The acts and practices of the respondents, the complaint charges, have tended to hinder and prevent price competition and to create in the respondents a monopoly in the sale of their products; have unreasonably restrained interstate commerce in such products, and have placed in the respondents the power to control and enhance prices.

In the food industry, according to the complaint, the dollar volume is approximately 2½ to 3 million dollars annually, the production volume is about 1½ billion pieces annually, and in the sale of the industry's products, price is a major factor. The complaint cites certain fluctuations in the price of food dishes and trays, and alleges that these fluctuations were in large part controlled and brought about by the larger manufacturers for the purpose and with the effect of eliminating the competition of the smaller companies and of dominating the industry.

The respondents are allowed 20 days to answer the complaint.

Superintendents Meet at Kalamazoo

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., May 11, 1938.—The annual Ladies' Night Dinner-Dance put on yearly by the Michigan Division of the American Pulp and Paper Mill Superintendents' Association was held at the Park-American Hotel Saturday evening, April 30, at 7 P. M. This year's party established a record for attendance, due to the hard work done by the committee on arrangements and tickets. The committee was Ray L. Barton, L. H. LaLiberte, Alfred Perlick, and Dan Stacey, and they did a fine job. Following the dinner Frank B. Eilers, who was toastmaster and master of ceremonies, kept a well selected and pleasing program of entertainment going top speed. At its termination dancing was enjoyed by the guests and their ladies. Robert Eminger, National Secretary, accompanied by Mrs. Eminger, were up from Miamisburg, Ohio, and were the guests of honor. Those present were:

Those in Attendance

Mr. and Mrs. Robert Eminger, Miamisburg, Ohio; Mr. and Mrs. Frank B. Eilers, Kalamazoo; Mr. and Mrs. Dan Stacey, American Box Board Company; Mr. and Mrs. L. H. LaLiberte, K. V. P. Company; Mr. and Mrs. Raymond Barton, Michigan Paper Company; Mr. and Mrs. F. L. Zellers, French Paper Company; Mr. and Mrs. R. H. Kelley, Marathon Paper Company; Mr. and Mrs. Al Perlick, K. V. P. Company; Mr. and Mrs. W. S. Taylor, American Cyanamid & Chemical Corp.; Mr. and Mrs. V. G. Heinmuller, American Cyanamid & Chemical Corp.; Mr. C. J. McMahon, Appleton Woolen Mills; Mr. Norman R. Stillwell, Foxboro Company; Mr. and Mrs. Glen Sutton, Sutherland Paper Company; Mr. and Mrs. Arnold Weller, Sutherland Paper Company; Mr. R. Dwayne Gould, Mr. and Mrs. C. H. Noble, Staley Corporation; Mr. C. H. Noble, Jr., Mr. and Mrs. R. F. Irwin, Mr. and Mrs. Paul Easton, Hercules Powder Company; Mr. and Mrs. C. A. Braginton, Michigan Paper Company; Mr. and Mrs. George Schmid, Michigan Paper Company; Mr. and Mrs. B. S. Hobson, Michigan Paper Company; Mr. and Mrs. J. H. Noble, K. V. P. Company; Mr. and Mrs. Otto Fisher, Bryant Paper Company; Mr. and Mrs. S. V. Cothrell, National Analine Corporation; Mr. and Mrs. George Rice, K. V. P. Company.

Mr. and Mrs. Walter B. Hadley, Detroit Paper Products Corporation; Mr. and Mrs. E. B. Taylor, American Cyanamid & Chemical Corporation; Mr. and Mrs. Milford Mossoman, American Boxboard Company; Mr. and Mrs. Samuel Stacy, American Box Board Company; Mr. and Mrs. Wm. H. Astel, Michigan Paper Company; Mr. and Mrs. L. H. Breyfogle, Kalamazoo; Mr. and Mrs. Wm. Mousson, Evanston, Ill.; Mr. and Mrs. L. M. Mongrieg, U. S. Rubber Products Company; Mr. and Mrs. Everett G. Walker, French Paper Company; Mr. and Mrs. Myron Flotow, French Paper Company; Mr. and Mrs. George Shinners, American Wire Works; Mr. and Mrs. Frank Schmiege, American Wire Works; Mr. and Mrs. Norman J. Cowie, Hawthorne Paper Company; Mr. and Mrs. W. K. Allen; Mr. and Mrs. O. W. Calligan, Edgar Brothers; Mr. and Mrs. Merton Fogerty, Michigan Paper Company; Mr. and Mrs. W. A. Kirkpatrick III, Allied Paper Mills; Mr. and Mrs. Neil Boyce; Mr. and Mrs. "Larry" Lynd, Vanderbilt Company; Mr. and Mrs. Art Cole, Rex Paper Company; Mr. and Mrs. G. F. Blackman.

Mr. and Mrs. R. W. Holden, Stowe & Woodward Company; Dr. and Mrs. Edgar A. Honey Jr., Kalamazoo; Mr. and Mrs. C. L. Bachelder, Hercules Powder Company; Mr. and Mrs. Art Woollam, Woollam Company; Mr. and Mrs. Al Sherwood, Sutherland Paper Company; Mr. and Mrs. Harry C. Pearson, Pioneer Paper Stock Corporation; Dr. and Mrs. J. T. Tainter, Mr. and Mrs. Paul Dumas, Chromium Corporation; E. J. Moran, Mr. and Mrs. Jacob Parent, Noble Wood Mfg. Co.; Mr. and Mrs. Leo Willoughby, Bryant Paper Co.; Mr. and Mrs. E. J. Roomsburg, Hawthorne Paper Co.; Mr. and Mrs. H. S. Johnston, Lee Paper Co.; Mr. and Mrs. F. H. Denham; Mr. and Mrs. B. Longnecker; Mr. and Mrs. R. L. Ward; Mr. and Mrs. W. G. Curry; Mr. and Mrs. W. H. Boyd, Chicago; Mr. and Mrs. Chas. Raney, Monroe Paper Products Corporation; Mr. and Mrs. L. L. "Buster" Griffith, Heller & Merz; Mr. and Mrs. Wm. J. Herring, Kalamazoo; Mr. and Mrs. C. "Baldy" Smith, Huron Milling Company.

Miss Leona Collins, Chicago; Miss Edith Miller, Kalamazoo; Miss Marjorie May, Kalamazoo; Miss Dorothy Holtzog, Niles; Miss Thelma Zellers, Niles; Miss Ann Stewart, Kalamazoo; Miss Evelyn Noble, Kalamazoo; Miss Stella Boers, Miss Marie Witters, Miss Maxine Scharp, Miss Myrtle Issaasn, Mrs. Van Leuvon, Mrs. Dan Rose, Mt. Pleasant, Mich.

Joseph Sullivan, Monroe Paper Products Company; E. M. Cowling, Hawthorne Paper Company; W. H. Siewert; John Den Bleyker, Upjohn Company; Robert Stewart, K. V. P. Company; Art McPhilips, Simons-Worden-White Company; David Klausmeyer, Illinois Envelope Company; Wayne Crotty, Bryant Paper Company; E. C. Jacobi, A. E. Broughton Company; J. Schwerman, Cameron Machine Company; H. E. Stafford, Hawthorne Paper Company.

H-O-H Lighthouse Reprints

D. W. Haering & Co., Inc., announce publication of a new twenty-four page catalog of articles dealing with scale and corrosion control in various types of water using systems.

This new catalog, "H-O-H Lighthouse Reprints," is profusely illustrated with photographs, charts, diagrams and graphs and contains articles on "Hot Water Conditioning," "Cooling Systems," "Heating Systems," "Internal Combustion Engines," "Chain Systems," "Why Proportion," and "Brine."

The chemist or engineer responsible for water conditions will find much of interest and value in this new Haering Literature. The subject of scale and corrosion control is covered in clear concise language along with descriptions of corrective and control measures.

Copies of "H-O-H Lighthouse Reprints" are available without charge or obligation to anyone writing D. W. Haering & Co., Inc., at 3408 W. Monroe street, Chicago, Ill., who indicates his business connection or line of professional activity.

Obituary

John F. Patton

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., May 6, 1938—John F. Patton, sales manager of the Brompton Pulp and Paper Company, died suddenly at the Montreal General Hospital yesterday. He was in his 67th year.

Born in Montreal, a son of the late Mr. and Mrs. Richard Patton, he was educated at the Montreal High School. Throughout his business career he was associated with the pulp and paper industry; he lived for some time in London, England, Chicago and New York before finally moving to Montreal some ten years ago.

Mr. Patton is survived by his wife, the former Miss Ethel Hendry, of Kinston, Ont.; five sons, H. Ross Patton and John H. Patton, both of London, England; T. Allan Patton, of Chicago; William S. Patton, of New York, and Thomas Patton, of Montreal; a daughter, Mrs. W. W. Ogilvie, of Montreal; a brother, Richard G. Patton, of St. Lambert; and three grandchildren.

Arthur W. Blackman

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., May 9, 1938—Arthur W. Blackman, president of D. F. Munroe Company, wholesale paper dealers, 289 Congress street, Boston, died May 3 at his home in Cambridge, Mass. Mr. Blackman, who was about 74 years old and widely known in the paper trade throughout the country, was stricken suddenly May 1.

Mr. Blackman was born in Boston and when a small boy the family moved to Cambridge and young Blackman obtained his education in the schools of that city. Mr. Blackman entered the paper trade as a young man more than a half century ago and in 1909 he became president of the company he headed at the time of his death.

He was past president of the New England Paper Merchants' Association, past president of the National Paper Trade Association, past president of the Boston Rotary Club, treasurer and trustee of the Hamilton Association, a member of the Faculty Club of Cambridge and a trustee of the North-av. Savings Bank, North Cambridge.

Surviving are the widow, two sons, Floyd H. of Chestnut Hill and John F. Blackman of Belmont, both of whom are associated with D. F. Munroe Company; two daughters, and eight grandchildren.

Malcolm M. Barr

Malcolm M. Barr, 64, prominent Toronto, Canada, business man, died of a heart attack April 30 in Salt Lake City, at the home of his stepdaughter, Mrs. Guy C. Hill.

Mr. Barr, a recognized authority in the paper industry, was on a leave of absence from his firm, Buntin, Reid Company, Ltd., but was en route to Canada to resume his work when stricken.

He was formerly employed by the Zellerbach Paper Company, in Seattle, Wash., and also associated with the Blake, Moffat and Towne paper distributors of Fresno, Cal.

Mr. Barr was born at Hamilton, Ontario, Canada, but came to the United States as a youth and became an American citizen.

Survivors include his widow; a son, Malcolm Douglas Barr, of Hamilton, Ontario; three sisters, and a brother, Alec Barr, of Los Angeles.

Burial will be in Wasatch Lawn Burial Park.

Harry A. Laird

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., May 9, 1938—Harry A. Laird, 54, traffic manager of the Chicago Tribune and well known in the paper and pulp industry as an authority in transportation, died May 2 of coronary thrombosis. He had been ill for six weeks.

Mr. Laird's first direct contact with the paper industry came in 1920 when the Tribune employed him to find freight cars for pulpwood needed at the paper mills when a car shortage developed in Canada. Soon after this he came to Chicago in the traffic department of the Chicago daily. Mr. Laird, during his life time, was a staunch advocate of regional consolidation of railroads as productive of greater efficiency and economy and of less governmental restriction for railroads, trucking companies and other divisions of the transportation industry. Surviving are his widow and two sons.

John J. Collison

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., May 9, 1938—John Jacob Collison, 68, died at his home in Victoria, B. C., recently. Mr. Collison was the owner of Collison's Limited, wholesale paper dealers and manufacturers' agents, 550 Yates street, Victoria.

He was born in Portsmouth, England, in 1870 and came to Canada at the age of 18. He resided for a number of years in Holland, Manitoba and had been engaged in business in Victoria for the past 33 years.

Chicago Expects Pickup in Fall

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., May 9, 1938.—The local paper industry continues to evidence a considerable amount of optimism despite the fact that present conditions provide little to merit such optimism. There is a rather general belief that bottom has been reached on most grades and lines of paper and that it would take very little to inject some definite buying into the picture. However, many local executives feel that it will be early Fall before any substantial pickup can possibly be noticed. Meanwhile, heavy costs of production are combining to keep prices from going any lower.

In the fine paper fields it is interesting to know that the best demand is coming in for higher quality merchandise, perhaps an indication that firms desire to retain quality letterheads and stationery and to economize more on their merchandising papers. Sulphite bonds seem to possess underlying strength although demand is spotty. Mills in the book field report rather unsatisfactory conditions while cover papers are likewise slow. The newsprint market shows little indication of immediate change, output feeling the curtailment of business on all sides. Groundwoods report little change. Board markets are likewise dull and the price structure reported none too firm. Kraft markets evidence the splendid spirit of the industry itself though demand is not good. Waste papers continue in an almost chaotic position.

Nashua Gummed Paper Dedicates Building

The modern new office building which now houses the administrative personnel of the Nashua Gummed and Coated Paper Company of Nashua, N. H., and which lies just west of its factory building and massive new addition on Franklin street, was formally dedicated to the founder of the company, the late James Richard Carter, by his son, now president of the firm, Winthrop L. Carter, in the presence of executives, department heads and the office staff at 1 o'clock Tuesday afternoon of last week. The ceremony included the unveiling of two tablets set up in the lobby of the office building, by Peter Travers, oldest employe in years of service, and the only employe remaining of that small group who came up from Boston in 1904 to take over the Nashua Card and Glazed Paper Company. Also in attendance were some dozen employes who have been with the company 30 years or more.

Mr. Carter, speaking for his associates, at the dedication ceremony, in part said:

Dedication Address

"For over 20 years we have talked and planned a separate building for our office and administrative activities. At last the thought has become a reality.

"The building which we are now to occupy is the most modern in architecture and construction of any building ever erected for this purpose in New England—if not in the entire country. As is the case in most plans which are long delayed in fulfillment, the realization is more complete as the result of the detailed and careful planning which the ample time of preparation made possible. In the conception of this building there were three fundamental purposes:

"First, that the building should be so designed as to space to make possible the greatest efficiency in the performance of the office functions of the company,

"Second, that the engineering design of the building should be such as to provide comfortable and hygienic working conditions, and

"Third, that the beauty of one's surroundings might add to one's personal joy in working in such a place.

"There has been the greatest cooperation from many of our own people in working out the plans for such a building. But, to our assistant treasurer, Oscar Tacy, I wish especially to express for myself, and for all of us gathered here, our appreciation for his tireless and painstaking direction of this job. Long before a single line of any plan was drawn he visited many buildings to study and learn what was best in office building architecture. He, together with others in our organization, made countless individual layouts of departments to find the most efficient use of space, that the work might flow through the office with the least obstruction and hindrance. Especially did he study such problems as sound-proofing, that the working conditions should be quiet and restful; of lighting, both natural and artificial, that there should be adequate illumination; of ventilation, that regardless of the number of people in any one room, the air should be changed as many times as necessary to insure an adequate amount of fresh and invigorating air under any conditions; and, finally, in the actual furnishing of the building he selected equipment not only suitable for the work for which it was designed but pleasing in design and harmonious with the general architectural features of the building. Oscar, it is indeed a pleasure to publicly recognize the splendid job you have done for us.

James Richard Carter

"You will recall in our old office a bronze bas-relief of James Richard Carter, which was most inappropriately framed and hung in a most inappropriate place. I suggested to our architect, Mr. Larson, that I hoped it would be possible to work out some plan for our lobby whereby this bas-relief could be made an architectural feature. He brought in some sketches and showed that this could be done, provided there was a second tablet to balance it on the opposite side of the entrance doorway. It is a common thing to install a tablet, giving the date of erection of the building, sometimes mentioning the names of the Directors, etc., so the matter was turned over to Mr. Brown and Mr. Nunez to suggest the proper inscription for this second tablet.

"They came to me and said, 'We don't think much of installing a second tablet with a stereotype inscription wholly unrelated to the bas-relief of Mr. Carter. We would like to see this new office building dedicated to the memory of your father—and a simple statement of that fact properly inscribed—thus tying the two tablets together for a given purpose.' It is nearly fifteen years since Mr. Carter died. I was very much touched that their loyalty and respect for his memory was such a very real thing to them after so many years. Their suggestion was immediately unanimously accepted by the Directors.

"These two tablets have now been installed one on either side of our entrance door. I like to feel that every morning we come to work we will glance up at these tablets, unconsciously deriving an inspiration for our work as our thoughts turn to the man some of us knew so well and whose memory all of us respect and admire."

The New Building

The new building is located to the west of the company's factory on Franklin street and is connected with the factory by an overhead enclosed walk. It is two stories high, of brick and glass wall construction and is the first office building in New England to be completely equipped with the new glass wall bricks. Each floor contains approximately 6,500 square feet and there is a cellar of 800 feet.

Cellar walls are reinforced concrete while the upper walls are of black brick, up to the first floor windows, then of Fiske gray brick to the roof. The large panels in the walls are filled with Owens-Illinois glass blocks. A steel frame carries the weight of the building.

Trimming in the lobby including the doors and sign is of aluminum with alumilite finish. The floor of the lobby and stair treads are of terrazzo. The glass blocks fill the requirements of giving perfect light without the disadvantage of heat.

Air Conditioned and Sound Proof

The building is divided into five sections so that

(Continued on page 50)

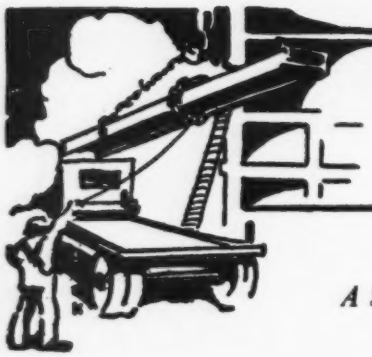
3 TIMES the SERVICE
—and none of the trouble!

12 TO 14 MONTHS' SERVICE was the maximum obtained from a long succession of belts used on the line-shaft drive operating a battery of beaters in a well-known mid-western paper mill. And during this comparatively short life there were usually two or three shutdowns to cut out stretch or replace fasteners.

THEN IN AUGUST 1934 a Goodyear COMPASS "40" Belt was applied to this drive on recommendation of the G. T. M.—Goodyear Technical Man. Today—*45 months later*—this COMPASS is still in service. It has already given more than *three* times longer service than the best previous belt—*and in all this time it has not required a single shutdown for repair!*

45 months—and still on the job

WHY IS COMPASS giving such long-wearing, economical, trouble-free performance in mill after mill? Simply because it is the most nearly stretchless belt built—a patented Goodyear construction. It will pay you to consult the G.T.M. about COMPASS Belting on your difficult drives. To bring this friendly adviser to your mill, write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.



CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Mount Vernon, Ohio—The Shellmar Products Company, 224 South Michigan avenue, Chicago, Ill., manufacturer of printed cellophane products, has awarded general contract to Sproul & Koenig, 228 North LaSalle street, for new addition to mill at Mount Vernon, recently referred to in these columns. It will be two-story, instead of one-story, as previously noted, 100 x 200 feet, and will cost approximately $75,000, with equipment, which will provide for large increase in present output. An award for structural steel framing has been made to the Mount Vernon Bridge Company, Mount Vernon, and for the installation of an air-conditioning system to the Surface Combustion Company, 1435 Dorr street, Toledo, Ohio. G. B. Young, 228 North LaSalle street, Chicago, is architect.

Lockland, Ohio—The Gardner-Richardson Company, Middletown, Ohio, manufacturer of paper board products, folding box board, etc., is considering construction of a one-story building on the old Miami-Erie Canal, vicinity of Patterson street, Lockland, to be used primarily for storage and distributing service for local mills. It is proposed to begin work soon. No estimate of cost has been announced.

Mentor, Ohio—The Columbia Match Company, Inc., recently organized, has acquired the former plant of the Ames Bag Machine Company, Mentor, comprising a one-story building with about 75,000 square feet of floor space, and will remodel and equip the new plant for the manufacture of book matches. Facilities will be provided for large output. It is proposed to have the plant ready for service early in the fall. J. H. Weaver, formerly head of the Cleveland Match Company, Cleveland, Ohio, merged some time ago with the Federal Match Corporation, Cleveland, will be president of the Columbia company.

Hoboken, N. J.—Fire recently damaged the paper storage plant of the Cardinale Wiping Material Company, Inc., 632 Monroe street. An official estimate of loss has not been announced. Plans for rebuilding are under consideration.

Mobile, Ala.—The Hollingsworth & Whitney Company, 140 Federal street, Boston, Mass., manufacturer of bond and other writing papers, waxed and other paper stocks, has secured permission to construct a pipe line to site of proposed new mill on waterfront at Mobile, where company has secured a 99-year lease on tract of land at the Alabama State Docks, as recently noted in these columns. The pipe line will be used for water supply for the mill, which will be developed for large capacity. It is understood that the plant will be used for the production of white paper stocks. Cost is estimated at close to $5,000,000, including buildings and machinery.

Tonawanda, N. Y.—Fire recently damaged a portion of warehouse building at plant of the Certain-teed Products Corporation, Military road, manufacturer of wall board products. An official estimate of loss has not been announced. It is proposed to rebuild the structure.

St. Paul, Minn.—The Minnesota Mining and Manufacturing Company, Forest street, manufacturer of sandpaper and other abrasive paper and allied products, has superstructure well advanced on new four-story addition to mill at Forest and Fauquier streets, previously referred to in these columns, and will push the erection to early completion. New unit will be 150 x 300 feet, with foundations arranged for three additional stories at later date. Company also is making improvements in existing plant buildings. Entire project is estimated to cost close to $400,000, with equipment. William M. Murphy & Son, New York Life Building, St. Paul, are general contractors. Toltz, King & Day, Inc., Pioneer Building, St. Paul, is architect and engineer. William L. McKnight is president.

Thorold, Ont.—The Ontario Paper Company, Ltd., manufacturer of newsprint, has plans under way for new pulp-handling plant on the Black River, including wharf, buildings and other facilities. Company also proposes the early erection of a new power plant in conjunction with the pulp-handling unit. Entire project is reported to cost about $200,000, including equipment.

Melbourne, Australia—Sir Keith Murdoch, head of the "Melbourne Herald," Melbourne, Victoria, is at the head of a project to construct and operate a new pulp and paper mill for the production of newsprint for a group of newspapers in Australia. Pine wood from Tasmania will be used for pulp wood supply, and a series of tests, now nearing completion, indicate that this material can be utilized successfully for such purpose. New plant will consist of several main units and group of miscellaneous buildings, and is reported to cost over $1,000,000, with equipment. It is proposed to have the mill ready for production in 1939. A suitable site will be secured at early date.

Hyderabad, India—The Government of the State of Hyderabad, Hyderabad, is projecting plans for the construction and operation of a state-owned

DU PONT PURPURINE

4B *Concentrated*

has a heritage of many years of service in the dyeing of paper and kindred products. It still holds an eminent position despite the competition of newer dyes and maintains supremacy in certain specialized fields

* * *

PAPER MILLS use Du Pont Purpurine 4B Concentrated because: They have learned to depend upon product uniformity.

Du Pont lays strict emphasis upon careful control during manufacture, which assures consistently uniform material of excellent solubility.

It possesses very good fastness to light in deep shades.

It may be thrown dry into the beater in mills where the stock is heated.

When run at a pH of 5.8 to 6.5, it produces very brilliant scarlet shades.

It is a very economical red for use in deep browns and maroons, where it may be run at a pH of 4.6 to 5.0.

Du Pont Purpurine 4B Concentrated finds wide use in the coloring of coffee bag and construction papers, wrapping and tissue papers and is the best dyestuff obtainable for red blotting. It is also used for the coloring of red fibers for granite papers.

DU PONT DYESTUFFS
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E. I. DU PONT DE NEMOURS & CO., INC.

Organic Chemicals Department...Dyestuffs Division

WILMINGTON, DELAWARE, U. S. A.

pulp and paper mill, and will arrange necessary fund for the enterprise in near future. Surveys and estimates of cost have been made by J. W. Alcock, Calcutta, India, consulting engineer. Proposed mill will consist of several units, with initial equipment for a capacity of about 6000 tons of finished paper per annum. Bamboo will be used for pulp wood supply. Project is estimated to cost close to $1,500,000, including site, buildings and machinery.

New Companies

Ansonia, Conn.—The Mag Container Corporation has been incorporated with capital of $50,000, to manufacture paper boxes and containers, etc. The principal incorporators are Raphael Korff and Benjamin M. Leipner, 1188 Main street, Bridgeport, Conn.

Philadelphia, Pa.—The All Paper Products Company, 611 West Mayfield street, has filed notice of organization, to deal in paper products of various kinds. Company is headed by Thomas J. Malone, address noted.

New York, N. Y.—The Federal Waste Paper Corporation has been chartered with capital of 100 shares of stock, no par value, to deal in waste paper goods. New company is represented by Stanley Osserman, 521 Fifth avenue, New York, attorney.

TAPPI Kalamazoo Valley Section Discusses Graphic Arts

The Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry met at the Park American Hotel, Kalamazoo, Mich., Thursday evening, May 5, and after an informal dinner Fred Gage, of the Gage Printing Company, Battle Creek, Mich., gave an especially fine talk, "Achievements in the Graphic Arts." Mr. Gage has been connected with the printing industry for over fifty years and comes from a family of printers. He is prominent in his field and well known in Kalamazoo. He was for seven years treasurer of the United Typothetae of America and ten years director; six years director of the American Photo Engravers Association; vice president and statistician of the International Electrotypers and Stereotypers Association for eight years.

Mr. Gage related having started as a "printer's devil" 56 years ago on an Adams Hand Press. At that time this was the most modern printing equipment. It turned out work at the rate of 400 per hour. He then traced through the various trends and developments that have taken place up to the present time. The advances that have been made are, he believes, due to the application of exact science and research. While some have been content to say certain things could not be done, such as the perfection of perfectly curved electrotypes, or the furnishing of good grade coated paper in rolls, others have set to work and accomplished them. He showed how laboratory research and technical knowledge have been able to develop the paper, ink, and printing methods that have made possible the high quality work of some recent publications.

Mr. Corliss Abbott, who is in charge of printing research at the Allied Paper Mills, gave a short talk on the Cornegie Institute of Technology School of Printing.

The next meeting will be at the Gull Lake Country Club on Thursday, June 2. There will be a golf tournament in the afternoon as well as swimming and other recreations. Among those present were:

C. W. Reade and James A. Helmer, Kalamazoo Wax Paper Products Company; H. E. Stafford and Carl C. Schneider, Hawthorne Paper Company; Al. Sherwood and John A. Keenan, Sutherland Paper Company; R. H. Hurst, G. H. Rice, W. F. Hathaway, J. De Wolf, M. H. Rutz, Hugh Smith and John Bauman, Kalamazoo Vegetable Parchment Company; Frank Whittington, Rex Paper Company; Fred Gage, Gage Printing Company; Joe Widmeyer, Corliss Abbott and Wm. A. Kirkpatrick, Allied Paper Mills; James A. Wise, Kalamazoo Paper Company; W. S. Taylor, American Cyanamid and Chemical Corporation; Ralph Atkins, Lee Paper Company; C. W. Steele and J. B. Stephenson, American Coating Mills; P. F. Neumann, Hercules Powder Company; Ray L. Barton, Wm. H. Astle, M. C. Schmid and Paul de Guehery, Michigan Paper Company; V. C. Mathis, Leo A. Willoughby and John A. Reightue, Bryant Paper Company; Jake O. Kline, Ray Olson, H. B. Johnston.

Correction

Through a misunderstanding, the article, "The Cobb Test for Greaseproof Paper" appeared in the "PAPER TRADE JOURNAL" for April 14. As a result of the discussion at Philadelphia TAPPI, the method has been improved and, at Miss Cobb's request, was to be published in another, revised form after Mr. Mellen's Committee had reported on it.

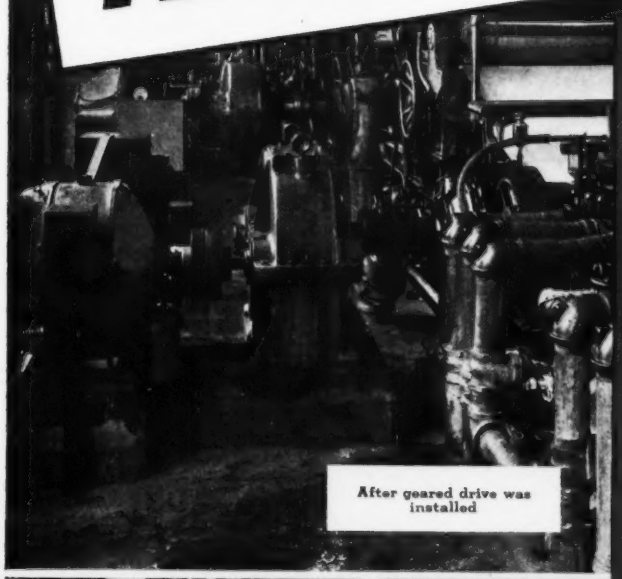
The important recent changes are:

1. Use of a 100 sq. cm. ring instead of a 25 sq. cm. ring.
2. Substitution of stained kerosene for turpentine.
3. Use of a weighed blank. A second greaseproof sample is bostitched to a blotter to make it identical with the test sample. The blank is stored in the tester under the sample being tested. The blank and test sample are separated by a good glassine sheet, to prevent leakage and penetration into the blank. Any change in weight in the blank is noted, and the corresponding adjustment made in the change in weight of the tested sample. Use of a blank makes it possible to conduct the overnight test in an unconditioned room, though it doubles the necessary amount of weighing.
4. The test is made for 18 hours, instead of 16.

While these changes have increased the reliability of the test, they have not been passed on by the greaseproof Committee. Formal publication will await pronouncement by the Committee.

NOW REQUIRES

72 HP instead of 120 HP



After geared drive was installed

Before geared drive was installed

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PAPER TRADE JOURNAL
ESTABLISHED 1872

Reg. U. S. Pat. Off.

George S. Macdonald, Pres. *Joseph P. Horgan, Secy.*
Executive and Editorial Offices, 15 West 47th St., New York, N. Y.

Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

Per Copy, 10 cents United States, Per Annum, $4.00
Canada and Foreign Countries in Postal Union, $6.00

Member Audit Bureau of Circulations

Vol. CVI New York, May 28, 1938 No. 19

COMING EVENTS IN THE PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry— Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park,American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILLS SUPERINTENDENTS ASSOCIATION, Annual meeting, Royal York Hotel, Toronto, Ont., June 22-24.

COOPERATION FOR RECOVERY

As the days of the depression continue and the shadow of unemployment lengthens it becomes more plainly evident that cooperation between the Government, management and labor are all essential for recovery. While the conclusion may be reached from the attitude of the Administration and some parts of the speeches of President Roosevelt toward organized business, that there exists a wide divergence between the objectives of the New Deal and the management of our important corporations, it is reasonable to believe that the differences can be merged by cooperation to effect a practical solution of the problem of recovery.

A particularly constructive step in this direction is suggested in the resolutions adopted by the Chamber of Commerce of the United States in the final session of its twenty-sixth annual meeting, held at Washington May 2-5. Prior to the publication of these resolutions, Lewis E. Pierson, chairman of the board of the Irving Trust Company of New York issued a statement which said in part: "Labor disturbances, regardless of the merits of any particular dispute, have been a major factor in creating the present business situation, in which management and labor, and every segment of the population, have alike suffered.

"Management and labor are natural allies, not enemies, and the well-being of one depends upon the well-being of the other. Private industry thrives and creates more jobs only when capital and labor work together harmoniously for the production of goods and services for the advancement of the American standard of living. I believe that the time has now come when management and labor should work together on those things of common interest which fairly protect their respective interests, promote industrial peace and stimulate employment on which the enduring prosperity of the nation depends."

In commenting on the management and labor situation, William Green, president of the American Federation of Labor said in part: "I consider it as a gesture at least toward labor and a change in the attitude of employers toward organized labor, collective bargaining and negotiation of wage agreements. My own opinion is that if this gesture could be developed toward a maximum of usefulness it could serve to overcome unemployment more than the efforts of anybody, including the Government. After all, employment can only come through the absorption of workers into private industry."

The sixteen point plan adopted by the Chamber of Commerce of the United States included resolutions on recovery, capital needs, labor relations, wages and hours, management and labor, agriculture, foreign trade, Federal anti-trust laws, Government competition, monetary policy, banking, railroad transportation, merchant marine, flood control, land and water policy, national defense and state and local taxation.

The resolutions concerning management and labor etc. said in part: "The Labor Relations Act and its administration exert influences working strongly against recovery. Recent action of the Labor Board is tantamount to public admission its proceedings have not been fair and impartial, and there has been ample demonstration the legislation has not fulfilled its stated purpose of lessening industrial disputes. We favor a thorough Congressional investigation to determine whether the act should be withdrawn entirely or whether amendments should be made. We advocate repeal of the act. If the act is not wholly withdrawn, we urge that it be structurally amended. Amendments should include protection of employes against interference of any of their rights, including their rights of self-organization, whether the interferences come from employers, employes or any one else."

"We believe that with regard to minimum wages, maximum hours and working conditions, there should be only such public regulation as may be validly applied by State Governments for those special classes of workers for which legislative pro-

tection may be necessary to prevent their oppression and to safeguard their health and well-being."

"In a number of foreign countries, the encroachment of government in the field of business has led to the partial, and in some cases, complete, liquidation of the rights and authority of management and labor. Such developments must, for the common welfare, be avoided in the United States. We believe that management and labor should work together without recourse to the Federal Government on these things of common concern which fairly conserve their respective interests, promote industrial peace and stimulate employment on which the prosperity of the country depends."

In reference to a monetary policy the Chamber said in part: "The Chamber reiterates its belief that the restoration of a satisfactory international monetary standard and strict maintenance of the integrity of the currencies of the world are vital needs of the times. Without the one there cannot be adequate revival of international trade, and without the other there can be no dependable basis for the operations of domestic commerce and industry. Both are essential for economic recovery."

In the resolution covering state and local taxes the Chamber said in part: "State and local taxes, combined with Federal levies, have increased until they are equivalent to one-fifth of the national income. We commend the several hundred member organizations which are actively working to foster economy and to reduce the tax burden in their States and communities."

Summer Paper Courses at Maine

The University of Maine will again conduct a summer course in pulp and paper technology during the six weeks between July 5 to August 12, 1938. Professors Paul D. Bray and John G. Caulfield will direct the work which includes lecture courses in pulp and paper manufacture, paper laboratory, pulp and paper coloring and bleaching, and paper testing and analysis.

These courses are designed for paper salesmen, laboratory helpers and all employees in the industry who previously have not had an opportunity to obtain a general scientific understanding of the pulp and paper industry.

In addition to class instruction and laboratory work there will be a number of mill visits.

A copy of the summer session catalogue, which explains courses offered, expenses, etc., may be obtained by addressing Director R. M. Peterson, University of Maine, Orono, Maine.

To Ship Pulp by Motorships

It is reported that the Kieckhefer paper groups have arranged for the movement of 14,000 tons of wood pulp from their new plant at Plymouth, N. C., to the Great Lakes for further handling by rail to their mills in Michigan. It is reported that the shipment will be handled by Ford motorships.

Production Ratio Report

The statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES

Months	1938(c)	1937(c)	1936	1935	1934
January	63.9%	90.3%	76.1%	65.8%	.....
February	68.6%	90.1%	77.9%	70.0%	.....
March	69.5%	90.3%	76.0%	70.5%	.....
April	.....	92.1%	82.3%	70.0%	.....
May	.....	90.6%	81.6%	69.4%	.....
June	.....	87.3%	80.7%	72.3%	.....
July	.....	81.8%	77.3%	64.9%	.....
August	.....	82.9%	81.5%	70.9%	.....
September	.....	78.6%	80.5%	71.9%	58.2%
October	.....	73.5%	87.6%	75.6%	64.7%
November	.....	61.9%	88.0%	75.3%	61.7%
December	.....	54.5%	85.9%	71.2%	59.6%
Year Average	.....	80.6%	81.3%	70.5%	.....
First 17 weeks	67.6%	90.7%	78.2%	68.9%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1938		CORRESPONDING WEEKS, 1937	
*March 26	68.5%	March 27	91.1%
*April 2	72.3%	April 3	89.7%
*April 9	67.3%	April 10	92.4%
*April 16	68.2%	April 17	93.3%
*April 23	66.9%	April 24	90.9%
*April 30	70.8%	May 1	91.6%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks					
Ratio Limits	March 26, 1938	April 2, 1938	April 9, 1938	April 16, 1938	April 23, 1938	April 30, 1938
0% to 50%	99	97	105	88	101	68
51% to 100%	208	209	202	210	186	146
Total Mills Reporting	307	306	307	298	287	214

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported by individual companies.

Paperboard Operating Ratios

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Mos.	1938 (e)	1937 (e)	1936	1935	Mos.	1938 (e)	1937 (e)	1936	1935
Jan.	55%	80%	61%	61%	July	....	67%	69%	59%
Feb.	61%	86%	67%	67%	Aug.	....	74%	75%	65%
Mar.	60%	87%	68%	67%	Sept.	....	70%	76%	69%
Apr.	....	89%	70%	61%	Oct.	....	66%	82%	76%
May	....	86%	68%	61%	Nov.	....	56%	79%	70%
June	....	75%	68%	65%	Dec.	....	46%	74%	60%

Week end. Mar. 26, 1938—62%
Week end. Apr. 2, 1938—61%
Week end. Apr. 9, 1938—58%
Week end. Apr. 16, 1938—58%
Week end. Apr. 23, 1938—54%
Week end. Apr. 30, 1938—59%

(e) Basic figures revised to include new members of the National Paperboard Assn.

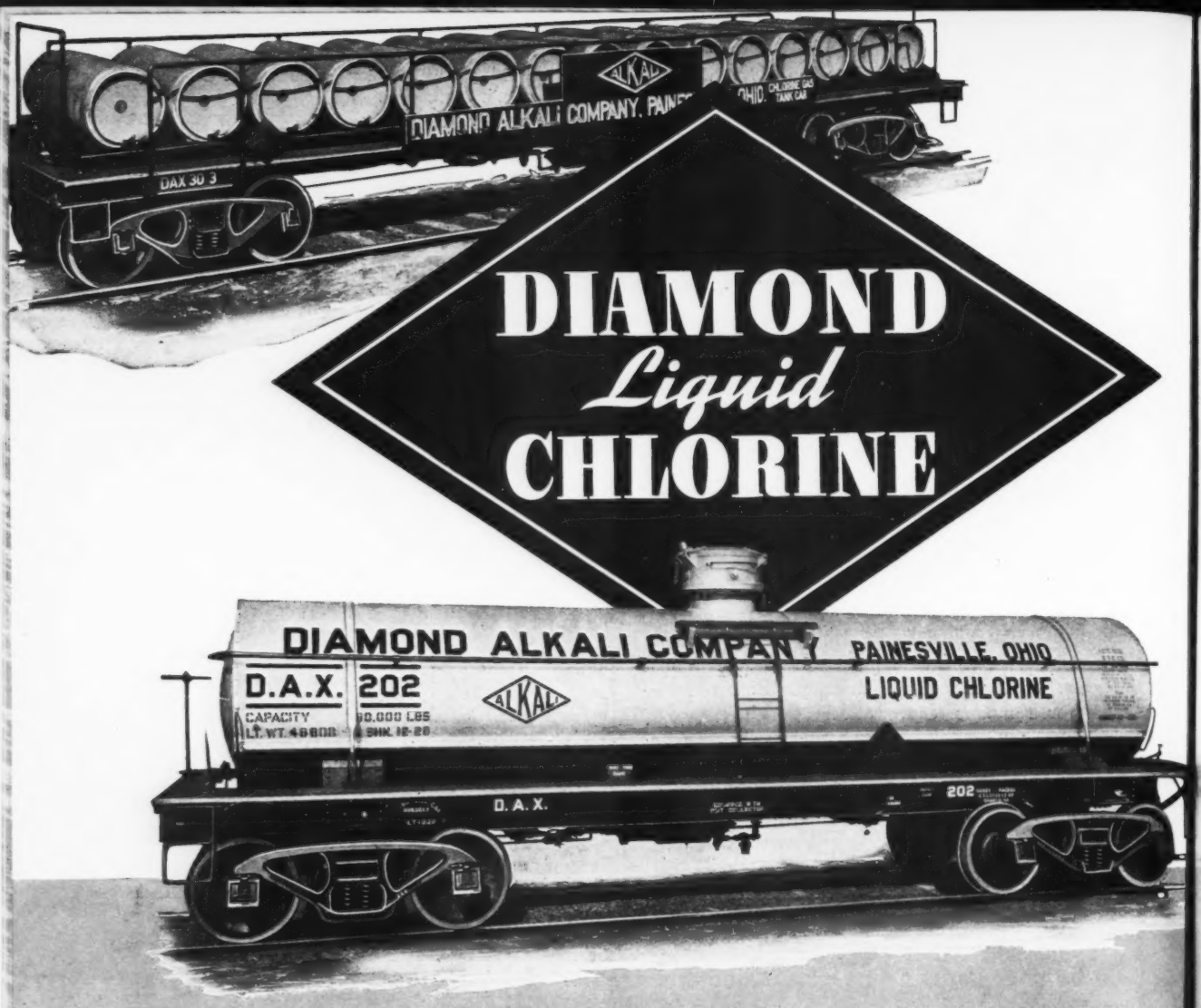
Bibliography of Paper Making

Continuing its policy, established last year, the Technical Association of the Pulp and Paper Industry has issued its annual Bibliography and Patent List for 1937 as a 218 page cloth bound volume as compiled by Clarence J. West, Chairman of the TAPPI Abstracts and Bibliography Committee.

In the preparation of the Bibliography the compiler had access to more than 150 periodicals currently received at the Institute of Paper Chemistry. It is believed that this survey of the literature covers all of the important scientific and technical journals of the world, and that practically every article of interest to the pulp and paper industry has been located from one source or another.

The patents have been selected from the Official Gazette of the United States Patent Office.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York, N. Y., at $3.00 each.



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Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Fastness to Light of Colored Papers*

By H. Ainsworth Harrison[1]

Abstract

A report to the Papermakers' Association of Great Britain and Ireland covering the factors governing the degree of fading when colored papers are exposed to light and the possibilities of standardizing such measurements.

Report

The property of fastness-to-light of colored papers is a very important one to the industry as a whole, much too important, indeed, to need any stressing, and it is somewhat surprising that comprehensive attempts have not previously been made to define this property, or to devise a suitable method of measuring it in some recognized way. A very considerable amount of work has been carried out in recent years, principally in England, the United States, and Germany, with the object of standardizing a method of determining the light-fastness of colored textiles; but, so far as we have been able to ascertain, practically no work of a similar nature has been undertaken by any association, institute, or other body interested in the manufacture of paper. True, individual firms, here and there, have evolved schemes suited to their own particular requirements, but even today there exists no generally accepted methods whereby manufacturer and user may communicate to each other in precise terms the required degree of light-fastness of any colored paper in which their mutual interest lies. It was for this reason that the Executive Committee of the Technical Section of the British Papermakers' Association in September, 1932, appointed a committee to investigate the possibility of drawing up fastness standards for making possible such an arrangement between interested parties. This contribution is a slightly abridged form of our First Report as delivered at a conference in London and printed in Tech. Sect. proceedings in October, 1936.

It should be clearly understood that we, as a committee, are not in the least concerned with methods of coloring paper so that it will possess good fastness-to-light: there already appears to have been some misunderstanding on this point. Nor are we concerned with determining the fastness properties of coloring matters themselves, for this would be an almost impossible task, since it depends not only on the dye, but to a very large extent on the fibrous furnish also, as well as on numerous other factors. The chemical changes which occur during fading, and the reasons for fading taking place, are also outside our scope. Our attention has been wholly devoted to considerations governing the determination of fading degree when colored papers are exposed to light, and the possibilities of standardizing such measurements. The problem, stated in simple terms, is to devise a method whereby the customer can specify, much more precisely than hitherto, the degree of fastness which he requires, in such a way that the papermaker, from gradually accumulated experience of the method and its significance, can ascertain whether he can expect to be able to satisfy the customer's requirements by the use of suitable dyestuffs and fibrous furnishes.

A little thought will show what a large number of difficulties this apparently simple objective involves. Some of these are discussed at the present stage, but others are more closely bound up with each distinct method of approach, and are enlarged on in the appropriate sections.

In the first place, there is the difficulty of a standard fading agency. Even sunlight gives different results in different localities and at different times of the day and year. Nor does any artificial source of light possess precisely the same spectrum as noonday sunlight; consequently, we cannot rely on any type of fading lamp to give results *in every case* comparable to those produced by the sun.

This brings us to our second difficulty, namely, variations in the atmospheric conditions. A great deal of attention was paid to this variable during the extensive investigations of the Society of Dyers and Colourists in England into the fastness of dyed textiles; we have therefore not thought it necessary to re-explore this ground, except to satisfy ourselves that with colored papers the influence of high humidity in promoting fading during light exposure tests is often quite as great as with dyed wool, certainly sufficient to make the consideration of humidity control inevitable. Temperature, too, quite apart from its effect on relative humidity, has been shown to exercise a significant, although smaller, effect. Amongst atmospheric impurities, sulphur dioxide particularly is known to affect the rate of fading of papers dyed with certain dyes.

It is, however, possible to control humidity and temperature, and to eliminate atmospheric impurities. A more difficult problem, since it introduces the personal factor, is to assess the fastness of papers which

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, DeSoto Hotel, Savannah, Ga., Oct. 18-21-1937.

[1] Member TAPPI. Chief Chemist Cooke & Nuttall Ltd., Horwich Lancs, England. Chairman Fastness to Light Committee of Technical Section of Papermakers Association of Gt. Britain and Ireland.

fade in different ways; some, for instance, ultimately bleach either wholly or in part, whereas others, especially yellow and orange shades, darken; comparatively few fade without any change in tone. This particular feature would appear to involve consideration of usage requirements, since it raises the question as to whether a paper which decreases in intensity of color is less satisfactory for a particular purpose than one which becomes darker. We have debated this question of usage very fully, and have come to the conclusion that, to consider the use for which a paper is intended, in determining its light-fastness, would for a variety of reasons be quite impracticable. What is required in this direction is for the user himself to consider the purpose a paper is to serve, and to specify its fastness accordingly.

Another difficulty in the way of fastness standardization is inherent in established methods of dyeing paper, namely the common practice of using dyes of different degrees of fastness in order to obtain certain shades: pigments topped with basic colors provide an extreme case. Not only is there a change in shade as fading proceeds, but an even greater difficulty is due to the fact that although fading may be rapid in the initial stages of exposure, owing to decomposition of the fugitive compound, once this has been removed, the remainder of the coloring matter may well be almost permanent. How can such a paper be compared for fastness with one dyed with a single dye which fades more or less uniformly over the whole exposure period? And how can another paper, dyed with the same dye as the last, but in a much paler shade, be compared for fastness with its deeper counterpart?

These and other considerations have had to be borne in mind in our attempt to devise a satisfactory method of determining fastness, and their consequences will be discussed as they arise during the description of our several lines of approach.

Methods

Methods which have previously been employed in the textile industries for determining light-fastness fall into two groups. In the first group, the sample is exposed to a standard fading agency until a definite amount of fading has occurred, the period required being taken as a measure of the fastness. This principle has considerable appeal on account of its simplicity, and it has the added recommendation of having been adopted by the British Cotton Industry Research Association. Two main difficulties detract, however, from its value for our purpose, namely the very high cost of the fading equipment, and the difficulty of determining, in the case of many colored papers, precisely what constitutes a satisfactory amount of fading. Both of these difficulties are dealt with in some detail later in the report.

In the second group of methods, the sample is exposed to light by the side of a series of colored standards of graded fastness, and subsequently compared with them. It is with methods of this type that most of our work has been concerned.

I. Method Based On the Use of the Society of Dyers & Colorists' Wool Standards.

When one of the two sets of wool standards described in the Report of the Society of Dyers and Colourists became available for the use of our own committee, it was at once obvious that before any other work was undertaken, the possibility of employing these wool standards, or of adapting them to our own needs, should be investigated. This was the more important, since several years' work and very considerable expenditure had resulted in the standardization of only two series of dyeings of graded fastness. It is admitted that there are objections to the use of dyeings on wool for the classification of faded papers, but these seemed to be relatively unimportant beside the alternative of attempting to evolve similar graded standards on paper, with a much more limited number of dyes available. Indeed, our financial resources were such that an undertaking of this sort was quite impossible, even had it been desirable.

In brief, the Society of Dyers and Colourists' two sets of standards were arrived at in the following manner: a large number of dyestuffs on a number of textile fibers were examined, not only for fastness to light, but for immunity from the effects of humidity, heat, and atmospheric impurities also, since it is evident that any dyeing which is seriously affected by any of these three factors is quite unsuitable for use as a fastness standard. Seven blue and seven red dyeings were finally selected, each being of suitable strength on Australian fleece wool made up into worsted serge of a particular specification. Each of these series ranges from very fast (no. 8) to fugitive (no. 2), any sample of fastness below no. 2 being classed as no. 1. These dyeings have been shown to be satisfactory by exposure under all sorts of atmospheric conditions in different parts of the world. Wool fabric was chosen because it was found that moisture and other agencies had less influence on the degree of fading of dyeings on this fiber than on the majority of other textile fibers; papermaking fibers were not considered. It is significant that the task of producing a range of standard green dyeings had to be abandoned owing to the difficulty of obtaining a suitable range of green dyes.

The identity of these standards is given in the published Report of the Society of Dyers and Colourists.

Standard No.	Blue	Red
2	0.5% Lissamine Violet 6BNS (I.C.I.) (C.I. 717)	0.5% Acid Magenta IIS (I.C.I.) (C.I. 692)
3	0.6% Brilliant Indocyanine 6B (I.G.)	0.5% Polar Red 3B conc. (Gy)
4	1.1% Polar Blue G conc. (Gy.)	1% Cloth Fast Red R (S.C.I.)
5	0.5% Solway Blue RS (I.C.I.) (C.I. 1076)	1% Alizarine Rubinole GW (I.G.) (C.I. 1091)
6	2% Alizarine Light Blue 4GL (S.)	1% Kiton Fast Red 4BL (S.C.I.)
7	4% Caledon Blue GCP 300, Powder (I.C.I.) (C.I. 1113)	1.2% Alizarine Orange A425, Powder (I.C.I.) on zinc (C.I. 1033)
8	3% Indigosol Blue AGG (D. & H.)	1.75% Durindone Red B400, Powder (I.C.I.) (C.I. 1207)

We considered that no. 5 standard was probably sufficiently fast to light for comparison with faded papers, and consequently nos. 6, 7, and 8 have not been employed in our investigations. It was felt, though, that no. 2 standard was probably not sufficiently fugitive for paper requirements, and another arbitrary standard, no. 1, was therefore included; this was 0.4% Brilliant wool blue FFR extra conc. (I.G.). We should like to make it quite clear that although this fugitive standard was suggested by the W.I.R.A. from their extensive records of fastness characteristics, it has no place in the official Society of Dyers and Colourists' standards, and has only been inserted to meet our own particular requirements.

The procedure is to expose the sample under ex-

amination by the side of one or other series of the standard patterns until sufficient fading has taken place for a comparison to be made. It is then said to possess a fastness number equal to that of the standard which shows a similar degree of fading. This procedure was carried out with 45 paper samples selected at random from a number supplied by four firms of papermakers, exposure tests being made in the Fugitometer for 30 hours, along with the blue set of standard wool patterns. No instructions are given in the Society of Dyers and Colourists' Report to assist observers in assessing the extent of fading, and our experiences in this connection, recorded below, show this to be a serious defect of the method as published, at least in so far as its application to the fading of colored paper is concerned. However, in our first series of tests we intentionally omitted to take the precaution of issuing instructions, with the object of determining whether the method could be applied without any modification whatsoever.

Series I

A number of people were asked to classify the exposed samples of paper by comparing them with the faded standards. 36 observers made these classifications visually, and the individual results were tabulated and summarized as shown in the following table. These results are referred to as Series 1.

* CLASSIFICATIONS, SERIES I

Number of observers tested	36
Average grouping	2.14
Average mean deviation	.38
Average standard deviation	.48
No. of samples placed in 1 group	1
No. of samples placed in 1 group, per cent	2
No. of samples placed in 2 groups	12
No. of samples placed in 2 groups, per cent	27
No. of samples placed in 3 groups	25
No. of samples placed in 3 groups, per cent	56
No. of samples placed in 4 groups	7
No. of samples placed in 4 groups, per cent	15
Percentage of samples with deviations which might be regarded as satisfactory, i.e., which are classified in one or two groups..	29

* FOOTNOTE TO TABLES.

The purpose of this and the succeeding tables is to give some indication of the reliability of the method.

"NUMBER OF OBSERVERS TESTED" is the number of persons who were asked to classify the 45 paper samples, each sample being allotted to the group corresponding to one of the standard patterns which are numbered 1 to 5.

"AVERAGE GROUPING" is the average of the group values given in the classifications of all samples by observers. It is not a criterion of the reliability of the method, and is included only as a matter of interest. We have accepted the average of all the votes on any particular sample as being the nearest approximation to its true fastness value.

By "deviation" is meant the difference between the number of the group to which an observer has allotted a sample and the average of all the votes cast for that sample. Thus, the deviations of the individual votes from that average are an indication of the consistency or otherwise of the various observers' judgments. The "mean deviation" of all the votes on a sample is an indication of the reliability with which such a sample has been classified. The "AVERAGE MEAN DEVIATION" of all the samples should therefore show the reliability of the method as a whole.

Statisticians appreciate that deviations from a mean usually have a significance which is not in direct proportion to their numerical value, for example, in this case a deviation of two groups is more than twice as bad as a deviation of only one group. Under these circumstances, it is a common practice to use as a criterion of the deviation, not the average mean deviation, but the square root of the average of the squares of the deviations (the root-mean-square) and this is termed the "standard deviation." The "AVERAGE STANDARD DEVIATION" is therefore the average of the standard deviation of all the samples. It is realized, however, that the average standard deviation is not an ideal criterion of the reliability of the method for our purpose, and therefore other data are given to show the proportion of the samples which have been classified in one, two, or more groups.

The value of any method of standardization depends largely on its accuracy of duplication between the same observer at different times, and between one observer and another. Provided that all normal observers allocate a sample either by visual or other methods to a particular group, the method would of course be satisfactory. It is not essential, however, that all observers' classifications shall be confined to one group (there will always be border-line cases which might belong to one of two groups), and in point of fact we believe the results may be considered sufficiently consistent if all classifications are confined to either one or two groups. Judged on this basis, the method is obviously far from satisfactory, since only 29 per cent of the samples were classified in such a way.

Series II

We appreciate that by the use of a photometer or some other instrument, the classifications would probably be more consistent. The necessity for such an instrument is, however, a considerable disadvantage, as it involves skilled operation, apart from increasing the cost. It was therefore decided to continue further with tests involving the visual method of judgment, assisted, however, by a number of guiding rules which are given in detail, since some of them at least we consider to be of fundamental importance in any method of determining fading degree.

1. A sample should be classified as having a fastness equal or superior to that of a particular standard, no matter how close it appears to the next standard of superior fastness; for example, if a sample be allotted to Group 3, it is implied that the fastness is between Groups 3 and 4, and is at least as good as the no. 3 standard.

2. The criterion of fastness should be *the contrast between* the faded and unfaded portions of the sample.

3. The observer should not concern himself with the use to which the paper is to be put.

4. While making his classification, the observer should take due precautions with respect to both the light in which the judgment is being made, and the background behind the sample.

5. A sample should be examined individually and not by the side of others, as there is a possibility that a decision already made might influence one's judgment.

6. As the criterion is one of contrast between faded and unfaded portions of a specimen, and there is a tendency for the more sharply defined line between them to emphasize the contrast in the case of paper, care should be taken to guard against prejudice from the distinctness or otherwise of the line.

7. The angle at which the samples and standards are viewed should be adjusted so that judgment is made on the color and not on the amount of light reflected.

8. Comparisons should be made in a bright, diffused daylight, preferably from a north aspect.

Criticism of the method was invited.

The necessity for Rule No. 1 was obvious: in Series I some observers had classified samples to the nearest standards, while others adopted the standards as limits of quality. Rules Nos. 3, 4, and 5 were inserted in consequence of irregularities noticed when Series I was being made. The rest were considered desirable.

The decision to include Rule no. 2 was made only after much discussion, and we fully realize that this conception of the significance of contrast is open to criticism. The difficulty is to reconcile the various ways in which fading can take place, namely, by loss of color, by darkenng, or by change of hue. It is impossible to estimate all three in similar units. Even if the conception of color components is simplified by reducing the number of units to comprise only loss

in depth and change in shade, either alone or together, the difficulty of judgment still remains. The adverse effect of fading is in general indicated, we believe, by the contrast between the faded and the unfaded portions of a material as it appears to the eye.

It will be appreciated that this principle leads to certain anomalous consequences which must be borne in mind when the method of judging fastness by contrast is applied. An example will make this clear: a paper dyed to only a pale tint with a fugitive dyestuff like methylene blue will fade completely in a very short time, after which very little change in shade will occur. Such a paper, judged by the contrast method, will be placed higher in the fastness scale than another paper dyed with the same dye, but to a greater depth, since fading in the latter case will proceed almost to completion as before, and the color difference between the faded and the unfaded portions will be much more pronounced. To continue the example still further, a paper dyed in a very deep shade with the same dye will not fade as much as the one of intermediate depth in the same time, and the contrast will once more become less. That is to say, the same paper dyed with the same dye will have varying degrees of fastness depending on the depth of shade; and furthermore, the fastness values, so far as the pale and intermediate shades are concerned, will be in the reverse order from that deduced from scientific principles, which indicate that paler shades are almost invariably more fugitive than deeper shades of the same dyestuff.

If contrast be not accepted as the criterion of the amount of fading, we are faced with the alternative of finding some other. Unfortunately, it is impossible to correlate the color changes which occur during fading, without the use of arbitrary factors. Certainly, attempts have been made to compare the different types of change by visual methods, but such methods merely bring us back to a system based on visual observations. As already stated, we believe that in general it is the distinctness or otherwise of the change when fading takes place which determines how objectionable that fading is, and this is defined by visual contrast.

The results of the revised classification, during which the above eight rules were applied, are referred to as Series II. It will be noted that owing to instruction no. 1, the number of standard groups has been increased from five to six, because any sample inferior to Standard no. 1, has to be placed in Group 0. For this reason it is not possible to compare the results from Series I with those from Series II.

In Series II the number of observers was increased to 120, and in an analysis of the results these observers were divided into three categories.

(a) Industrial, that is, those who had had considerable experience in color judging but had had little or no academic training.

(b) Scientific, being observers who had had a scientific training and might or might not have had industrial experience.

(c) Non-technical, consisting of people without academic training and unaccustomed to the judging of colored materials.

The results were tabulated and summarized under classification, Series II.

From these results it appears that, even with guidance, the visual comparison and classification

CLASSIFICATIONS, SERIES II.

	Industrial	Scientific	Non-Technical
Number of observers tested	40	40	40
Average grouping	1.83	1.74	1.96
Average mean deviation	.48	.45	.49
Average standard deviation	.62	.56	.61
No. of samples placed in 1 group	0	0	0
No. of samples placed in 1 group, per cent	0	0	0
No. of samples placed in 2 groups	4	6	7
No. of samples placed in 2 groups, per cent	9	13	16
No. of samples placed in 3 groups	24	29	12
No. of samples placed in 3 groups, per cent	53	64	27
No. of samples placed in 4 groups	14	9	23
No. of samples placed in 4 groups, per cent	31	20	51
No. of samples placed in 5 groups	3	1	2
No. of samples placed in 5 groups, per cent	7	2	4
No. of samples placed in 6 groups	....	....	1
No. of samples placed in 6 groups, per cent	....	....	2
Percentage of samples with deviations which might be regarded as satisfactory; i.e., which are classified in one or two groups	9	13	16

of samples against wool standards is so inconsistent as to make the method unreliable, at any rate under the conditions of the investigation. It may be suggested that an observer, on being asked to classify so many as 45 samples at once, is unlikely to give as much care and attention to the operation as if he were asked to classify only 1 or 2 samples; this was appreciated, and efforts were made to guard against it.

Criticisms by observers were not offered in every case. Many expressed satisfaction with the method, but realized that the test of whether it would be adequate or not would be shown by the results of the classification. The following notes have been made from the criticisms:—

Out of 120 observers,

8 objected to contrast as a criterion of fading,

10 complained that the standard patterns were badly spaced,

5 objected to the variation in color of the standards,

9 would have preferred standards in other colors, and in some cases in other strengths.

5 thought that there were too many standards,

6 thought that there were too few standards,

9 would have preferred that the standards had been on paper, mainly apparently because they used the distinctness of the dividing line between faded and unfaded portions as their criterion. (The paper samples tended to have a fairly sharp line of demarcation, whereas with the comparatively rough wool standards its distinctness varied).

Series III

As the criterion of contrast had been adopted as the measure of the amount of fading, it was thought that some method of nullifying the composite effect of differences in the various color components might assist observers when making judgments. Accordingly, a photographic negative was prepared on which was a series of parallel steps of graduated density.

CLASSIFICATIONS, SERIES III.

	Without screen	With screen
Number of observers tested	40	40
Average grouping	1.84	1.63
Average mean deviation	.46	.39
Average standard deviation	.57	.51
No. of samples placed in 1 group	0	3
No. of samples placed in 1 group, per cent	....	7
No. of samples placed in 2 groups	8	11
No. of samples placed in 2 groups, per cent	18	24
No. of samples placed in 3 groups	23	18
No. of samples placed in 3 groups, per cent	51	40
No. of samples placed in 4 groups	10	13
No. of samples placed in 4 groups, per cent	22	29
No. of samples placed in 5 groups	4	0
No. of samples placed in 5 groups, per cent	9	....
Percentage of samples with deviations which might be regarded as satisfactory; i.e., which are classified in one or two groups	18	31

On viewing the sample and the standard through the appropriate step, differences in hue, shade, and brightness tend to disappear, whilst contrast of faded and unfaded areas can be seen. Another series of classifications was then made in which observers formed their judgments first as in Series II, and then by making the comparisons while looking at the specimens through the screen. The two sets of results were tabulated and summarized as before, and the new results are recorded as Series III.

These results indicate that, for psychological or other reasons, some improvement can be obtained by the use of a screen, but the method is still very far from being perfect.

Series IV

It was thought that the improvement in Series III might be due to increased experience in judging, so a further set of results was obtained, in which observers were asked to repeat their classifications. This yielded the following figures—Series IV.

CLASSIFICATIONS, SERIES IV.

	First judgment	Second judgment
Number of observers tested	25	25
Average grouping	2.03	1.99
Average mean deviation	.48	.42
Average standard deviation	.58	.54
No. of samples placed in 1 group	0	1
No. of samples placed in 1 group, per cent	....	2
No. of samples placed in 2 groups	12	13
No. of samples placed in 2 groups, per cent	27	29
No. of samples placed in 3 groups	23	27
No. of samples placed in 3 groups, per cent	51	60
No. of samples placed in 4 groups	9	3
No. of samples placed in 4 groups, per cent	20	7
No. of samples placed in 5 groups	1	1
No. of samples placed in 5 groups, per cent	2	2
Percentage of samples with deviations which might be regarded as satisfactory; i.e., which are classified in one or two groups	27	31

Series IV classifications indicate that practice in judging does lead to more consistent judgment. At the same time the use of a screen or other similar method of assisting judgment would appear to be justified; the screen itself is, however, inconvenient to handle.

Series V

It was decided therefore to construct a special box in which sample and standard could be illuminated to a controllable extent by means of shutters. On viewing the specimens through a hole in the front of the box, they could be compared using just sufficient lighting to enable the contrast to be seen. In this way the effect of differences in the various color components could be minimized, and the judgment made on the distinctness or otherwise of the faded area.

In view of the probability that the average of repeated judgments would lead to more satisfactory agreement, this Series V was arranged to yield two separate sets of results. The first, termed "First judgment," was as indicated; the second, termed "Best two of three judgments," was obtained by asking an observer after completion of his first classification, and usually on another day, to make a second. When the result was similar to that made in the first classification, it was accepted as the best of three; but when it differed, a third was asked for, again at an appreciable interval after the second. In order to make allowance for the possibility of uneven illumination in the box, the relative positions of sample and standard were reversed in the first and second classifications; the third was made with the specimens in both positions.

Whilst this series was being made, lack of daylight led to an attempt to use artificial light. The box was placed in front of a white screen—a sheet of paper loaded with titanium oxide—this was illuminated by a 300-watt gas-filled lamp at a distance of about 30 cm., the lamp being arranged so that the specimens were evenly illuminated. After four observers had made their classifications, it was found that they were consistently allotting certain samples to groups to which they had not usually been allotted before. Classification was repeated with daylight, and showed that the kind of illumination has a definite effect on the grouping, and the necessity for the use of day or similar light for the comparison of faded patterns is indicated.

The results of Series V classifications were tabulated and summarized. They are given below together with similar figures for Series III made without the screen, with which they are directly comparable.

CLASSIFICATIONS, SERIES V.

	Series III without screen	Series V	
		First judgment	Best two of three judgments
Number of observers tested	40	30	30
Average grouping	1.84	1.31	1.29
Average mean groupings	.46	.31	.24
Average standard deviation	.57	.39	.30
No. of samples placed in 1 group	0	9	10
No. of samples placed in 1 group, per cent	....	20	22
No. of samples placed in 2 groups	8	10	24
No. of samples placed in 2 groups, per cent	18	22	53
No. of samples placed in 3 groups	23	23	10
No. of samples placed in 3 groups, per cent	51	51	22
No. of samples placed in 4 groups	10	3	1
No. of samples placed in 4 groups, per cent	22	7	2
No. of samples placed in 5 groups	4	0	0
No. of samples placed in 5 groups, per cent	9	....	....
Percentage of samples with deviations which might be regarded as satisfactory; i.e., which are classified in one or two groups	18	42	76

Series V indicates that a considerable improvement can be obtained by the use of a special viewing device; and furthermore, that in order to obtain the best results, it will probably be necessary to take the average of at least three, and probably more, independent and unprejudiced judgments. We have since designed another and more convenient viewing device so that our experiments may be continued on these lines, and the possibility of viewing the samples in artificial light is also being considered in this connection. Whatever method of setting up fastness standards may be ultimately adopted, the above results show that it will be necessary to employ a viewing box or similar device for classification purposes, so long as the conception of contrast as a measure of fading degree is adhered to.

II. Method Employing Printed Standards of Contrast.

About the time that the wool standards method was giving such disappointing results (Series II), we decided to attempt the preparation of standards of contrast in other ways.

A simple method which at once suggested itself is to expose the sample for a definite time, and compare the fading produced, with a set of artificially prepared standards of contrast in or near the color of the sample. These standards would be made by printing on a suitable paper a representation of a color which has faded in steps; the printing inks used would be chosen for their permanence, and there is no reason why they should not be printed in a sufficient range of colors. Furthermore, a strict com-

parison of fastness degree would be possible between one set of colors and another. This might be an improvement over standards in various colors prepared by any other method, since it will obviously be very difficult to secure such equality of fastness in the different series prepared by the use of different dyes. On the other hand, the difficulty of judging an intermediate color against more than one range of standards would still remain. However, this very simple method is dependent entirely on the use of a standard source of light of such a kind that it simulates the fading qualities of average sunlight. Although the Fugitometer has been employed with considerable success in many of our experiments, and may ultimately have to be adopted, we are not yet satisfied that any commercial type of lamp which will perfectly fulfil this requirement is yet available, and in consequence we cannot at this stage recommend any particular lamp as being perfectly suitable for the many varied kinds of dyed paper. Furthermore, we are very loath to specify any conditions which would necessitate appreciable capital outlay for their observance, and the cost of the best of the fading lamps now on the market is quite considerable. On the other hand, we appreciate that any method which we may ultimately recommend should be such that anyone fortunate enough to possess a good fading lamp should be able to employ it for rapid fading, provided he is aware of the possibility of obtaining anomalous results with papers dyed with certain colors.

III. Method Involving Measurement of Loss of Fluorescence.

A method has recently been proposed by J. Grant, in which it is suggested that advantage might be taken of the falling off in fluorescence, which occurs during exposure with certain types of paper. We have not examined this method in any great detail, because it would appear to have only a limited application. Most dyestuffs contain varying quantities of by-products and of intermediates, which themselves are capable in many cases of yielding striking fluorescences. In some cases a trace of such impurity, not in itself fast to light, causes a fast dyeing of a dyestuff to fluoresce strongly in ultra-violet light. This fluorescence is not constant for different batches of the dyestuff, and no difference in fastness to light can be perceived visually and attributed to these variations: a good example of this occurs with Oxyphenine 2G. Furthermore, traces of more fugitive dyestuffs, used in topping, result in a considerable loss in fluorescence with only a small degree of fading. Other complicating factors affecting fluorescence include the fibrous furnish, and the presence of starches and fillers.

Even if the loss in fluorescence went hand in hand with fugitivity, a method of measuring the loss in fluorescence would still have to be found and our difficulties would only have been removed to another field.

IV. Method Involving the Preparation of Graded Standards on Paper By the Use of Mixtures of Coloring Matters of Different Fastness.

For this purpose we have made a set of eleven paper standards by mixing three dyestuffs, one very fugitive, one of medium fastness, and one extremely fast. The standards have been prepared by dyeing a bleached sulphite pulp under controlled conditions according to the following scheme.

	1	2	3	4	5	6	7	8	9	10	11
Thiazol Yellow, per cent	.25	.20	.15	.10	.05	..	..	..	..	..	..
Chlorantine Fast Yellow 5GLL, per cent	..	.06	.12	.18	.24	.30	.24	.18	.12	.06	..
Monolite Fast Yellow GNS, per cent	..	..	..	..	..	..	.7	1.4	2.1	2.8	3.5

No. 1 is very fugitive, and the fastness gradually increases, No. 11 being extremely fast. These standards show a more regular gradation in fastness than the Society of Dyers and Colourists' standards, and the tone is constant throughout the range. So far it has not proved possible to produce satisfactory standards in colors other than yellow, but we hope that if this should be necessary the problem will not prove insoluble. It is unfortunate, though, that no other color than yellow should have been successful, since this color is one which is notoriously difficult to judge visually.

V. Method Involving the Preparation of Graded Standards On Paper By Dyeing to Different Depths and Shade.

In view of the limited possibilities of the previous method, another line of attack was suggested. It was felt that a number of series of colored papers might be prepared from yellow, orange, red, violet, blue, green, brown, and black dyestuffs of good fastness to light, which would fade in their own tone as far as possible, and which when dyed in varying depths of shade would provide a practical range of standards.

With a view to determining this possibility, comparative exposure test patterns were prepared in 0.05, 0.1, 0.2, 0.4, 0.8, 1.2, 1.6 and 2.0 per cent shades of

Oxyphenine 2G
Chlorantine Fast Orange TGLL
Chlorantine Fast Red K
Paper Scarlet N
Chlorantine Fast Brown 5GLL
Chlorantine Fast Blue GLL
Chlorantine Fast Green 5BLL
Direct Sky Blue GS, coppered

and exposed for 12, 24 and 36 hours to direct sunlight.

The results of these exposure tests are sufficiently promising to justify further consideration if other methods should fail, since graduated ranges on these lines define gradation in fastness more clearly than the standards recommended by the Society of Dyers and Colourists. It has been found comparatively easy to assess the fading of patterns against these standards, largely because the determination is more readily made by the selection of one of the standard ranges approaching as near as possible to the shade under consideration, but we have no statistical data to offer yet. Standards on these lines would enable blue patterns to be tested against blue dyed standards, red patterns against red standards, and so on. There may possibly be differences in the degree of fastness between the standards for the different colors, but these are not so marked as to be of practical importance.

VI. Method Involving the Use of a Fading Agent, With Paper Standards.

This paper has so far indicated the difficulty of drawing up standards of varying fastness on paper by the use of different dyes. Consideration of this problem from another angle, however, indicated the possibility of varying, not the dyestuff, but the fibrous

furnish, between one standard and another. It is well known, of course, that unbleached pulps, unlike bleached pulps, do not in general provide a satisfactory basis for light-fast dyeings, inasmuch that they themselves are adversely affected by light. This being so, it seemed feasible to suppose that fibrous furnishes containing varying proportions of bleached and unbleached pulps might, when dyed with a single dyestuff, afford a useful range of fastness values. In order to extend the range somewhat at the fugitive end, mechanical pulp was also introduced as part of the furnish in certain cases. It is obvious that the number of dyes which might give satisfactory results is limited by the necessity for securing fast dyeings on bleached pulp so as to provide a standard at the fast end of the scale.

Preliminary experiments were made with a wide variety of bleached—unbleached sulphite—mechanical furnishes, sized, and dyed with 3 per cent. Oxyphenine GG. It was at once apparent that the presence of mechanical pulp had adversely affected dyestuff retention, since all furnishes containing it were much paler in shade. Exposure tests, both to sunlight and artificial light, indicated further defects of the method as applied to yellow dyeings, particularly as regards tendency to turn brown. This is partly due to the nature of the dye itself, but more to the influence of the darkening due to the presence of lignin being exaggerated by the yellow background. Attempts to remove this defect by employing mechanical pulp which had been brightened by the addition of 4 per cent. zinc hydrosulphite were unsuccessful, since this treatment was shown to have only a small effect in preventing browning in either the undyed or the dyed pulp.

A repetition of the method using Chlorazol Fast Scarlet 4BS, on furnishes which included 100 per cent. bleached sulphite, 100 per cent, unbleached sulphite, and 100 per cent. mechanical pulp as well as mixtures of each (the amount of dye being varied according to the furnish so as to maintain an approximately uniform depth of color), gave a much better graded series when exposed both to daylight and artificial light, but the range was not sufficiently extensive, and there was also a marked change in hue at the fugitive end. A further defect was that the fastest member of the range was not sufficiently fast for the purpose. Chlorazol Fast Blue 2BNS, on a similar series of furnishes, gave somewhat similar results. From these preliminary experiments it was evident that the idea of employing mixed fibrous furnishes was not likely to lead to anything definite.

Our attention was next directed to the possibility of using both a single furnish and a single dye, the latter of such a type that fastness gradings might be brought about by the addition of some chemical compound capable of reducing light-fastness. In this manner only one variable would be introduced, namely, the percentage of the sensitizing agent. A limited number of such compounds are available, and after some preliminary experiments, hexadecyl pyridinium bromide was selected (referred to subsequently as X). The general plan was to choose a number of dyestuffs the light-fastness of which is adversely affected by the presence of small amounts of this compound, and with them to dye bleached sulphite pulp in such a way that a range of dyeings would be produced, which on exposure to light would show a step-by-step gradation in fastness. Such a series, of the gradation could be made uniform under all fading conditions by careful adjustment of amounts of X, would then serve as a set of standards in much the same way as the wool standards, but with several advantages:—(1) one would expect to be able to obtain a large number of standards, if that were thought desirable, merely by very slight changes in the quantity of X used; (2) the standards would be available in a variety of colors, so avoiding the necessity of judging faded patterns against standards of one or two colors only; (3) similarly, they would be available in both pale and deep shades; (4) each set of standards would, it was hoped, have the same color throughout, instead of different shades as in the wool standards; and (5) the effect of humidity on fading could be more easily eliminated, owing to the identity of the dyestuff throughout each series of colors.

For this purpose, bleached sulphite pulp, beaten to 30-40 deg. S.R., was dyed with 1.0 per cent. (in some cases with 0.5 per cent. and 0.25 per cent. also) of the dyestuffs (all of which belonged to the Direct class). No rosin size was used, and in most tests alum was also omitted. The amount of X was varied according to the percentage of dye used; where this latter was 1.0 per cent., the percentage range of X extended from 0.5 to 5.0, but when the dye percentage was 0.5 or 0.25, the percentage range of X was correspondingly reduced. From one member of each series, X was omitted. All dyeing and laboratory sheet-making conditions were standardized.

The dyes examined are given in the following list:

Dye	Concentrations, per cent		
Chlorazol Fast Red KS	1.0*	0.5	0.25
Chlorazol Fast Blue FFKS	1.0*	0.5	0.25
Chlorazol Fast Grev 2BKS	1.0	0.5	
Chlorazol Brown MS	1.0	0.5	
Chlorantine Fast Green BLL	1.0	0.5	
Chlorazol Fast Yellow BNS	1.0	0.5	
Chrysophenine GS	1.0*		

* With and without alum; all others without alum only.

In all, 93 sheets were so prepared.

Exposure to sunlight and to filtered ultra-violet light until fading of the fastest (untreated) pattern had just begun, showed that a gradation in fastness had been achieved in every case. The two yellow series were least satisfactory, but for preliminary experiments all the others were very promising. It is true that the gradations were not always uniform; where gaps occurred, however, it was possible, by the addition of intermediate quantities of X in repeated tests, to obtain dyeings of intermediate fastness, thus indicating that almost any number of standards might be prepared by this method if required. In one or two instances, notably the red series, there was a change in shade, though not sufficient to invalidate the results. The results as a whole were considered sufficiently promising to warrant identical sets of all the samples being sent along with sets of blue and red wool standards, to the Wool Industries Research Association fading station at Torridon, Leeds, England; the Royal Observatory, Cape of Good Hope; the Indian Institute of Science, Bangalore; and the India Meteorological Office, Kodaikanal. It will readily be realized that the fading conditions at those stations situated abroad may be much more severe than any which obtain in this country. Unfortunately, the sets which were exposed at the Cape of Good Hope and at Bangalore were damaged by sudden rainstorms, and the results are almost valueless. Those exposed at Kodaikanal, how-

ever, were much more satisfactory. This observatory is 7,688 feet above sea level, so that the sunlight is probably richer in ultra-violet radiation than at sea level. The samples were exposed for 6, 12, 24, 48, and 96 hours to bright sunshine only, being removed indoors during cloudy periods; the gradations obtained confirm the promise of the method.

Fading tests carried out at 33 per cent. and 85 per cent. relative humidity showed that over this range this variable was almost without effect on the colored papers under examination even after they had been rendered sensitive to light by the use of X.

It is evident from an examination of the faded patterns produced on these lines that there are two chief difficulties connected with the method of employing a sensitizing agent. In the first place, the fastness range is limited both by the optimum fastness of the dye employed and by the degree of fugitivity conferred by the use of X; and secondly, many experiments of a trial-and-error nature would be necessary in order to obtain a range of equally spaced standards. It is clear from the results already obtained that there is not always a direct relationship between the amount of X added and the ensuing fastness. In view of these difficulties, and the even greater promise of other methods of approach, further work in this direction has been postponed.

VII. The Wedge System of Standard Contrasts.

Probably the most promising method we have yet investigated is a novel one which breaks away altogether from the conception of a graded range of standards, and thereby removes at once many of the inherent objections to such standards, whether they be on wool, paper, or any other fiber. The objects of this method are two-fold:—(1) to measure the amount of daylight or artificial light to which samples are exposed, and (2) to yield a series of graduated contrasts, for comparison with the simultaneously faded sample.

In order to fulfil the first purpose, it is obviously unnecessary to employ a series of patterns; one satisfactory actinometer paper would be sufficient.

In order to produce a graduated series of fadings for the second requirement, it is not necessary to provide several papers of different fastness; it will suffice to have one standard pattern faded to different extents. This can be accomplished by super-imposing on the standard during exposure a screen graded in density so as to yield fadings which exhibit the required degrees of contrast.

The problem, therefore, resolves itself into two parts, namely, (a) the discovery of a suitable actinometer paper, and (b) the preparation of a satsfactory graduated screen.

(a) To be suitable, an actinometer paper must have the following characteristics:—

1. It should fade straight, that is, on exposure there should be no change in hue, or darkening; it should only lose color, and eventually be bleached to a color approximating to white.

2. It should be fugitive. The fastness should in general be no greater than the fastness of any sample likely to be tested; if it is, an unnecessarily long exposure period would be required.

3. It should be unaffected by sulphur dioxide or any other agency, except light, with which it is likely to come into contact.

4. It should be affected as little as possible by variations in relative humidity.

5. The strength of the color should be such as to give ample range of fading, that is, it should be capable of producing on exposure the maximum contrast likely to be required.

6. Its manufacture should be readily reproducible.

7. Its fading properties should not change with age, if stored under satisfactory conditions.

Experiments have been made on a number of colored papers. One made from pure cotton pulp colored with 4 per cent Acid Rhodamine 3R, with the addition of 2 per cent of rosin size and 4 per cent of alum showed considerable promise, but at this stage of our investigations we only claim that a paper colored with this dye appears to be suitable for use in conjunction with the various types of wedges with which we are experimenting. We have certainly eliminated a large number of dyestuffs for this purpose on account of their lack of fugitivity, inability to fade straight, and sensitivity to sulphur dioxide. Sensitivity to change in relative humidity is another eliminating feature which we have not yet thoroughly explored. Basic dyes which need fixing with tannic acid have not been fully considered, because we wish to eliminate as many variables as possible during the preparation of our ultimate standard actinometer paper. For this reason, the use of alum for fixing Acid Rhodamine 3R in the present case will probably militate against the final selection of this dye, for we have been successful in discovering another dye, which possesses the required affinity for cotton pulp and at the same time shows the other necessary attributes. Further discussion of it here would, however, be premature.

(b) Our first attempt to prepare a graduated screen was by using a strip of photographic film. This was exposed in strips in the ratios 1 : 2 : 4 : 8 : 16 : 32, developed and fixed in the ordinary way. Unfortunately, the film itself did not withstand the heat to which it was subjected in a Fadeometer.

A photographic negative on glass was then tried, but the transmission of the silver deposit was altered by the intense light of the arc.

A screen of neutral pot glass, graduated by steps, was then obtained, but proved unsatisfactory at first because the cement used in its construction either softened with the heat of exposure or developed bubbles, depending on whether it was a soft or a hard type. The plates were then mounted in a frame without involving the use of cement, and in this form may be satisfactory. There are seven steps, which transmit light in the ratios 1 : 1/2 : 1/4 : 1/8 : 1/16 : 1/32 : 1/64; it is about 14 cm. by 5.5 cm., so that each step is 2 cm. wide. The disadvantages of this screen or wedge are that it is fragile at the thin end and bulky at the other (about 0.5 cm. thick), and that it costs about £6.

Attempts were therefore made to prepare wedges by employing paper, the different steps being built up from numbers of layers. This can be done in spite of the fact that the light transmission is not in direct ratio to the calculated number of sheets. The paper used was an imitation manifold, and preliminary experiments showed considerable promise, but the paper did not remain unaffected

by prolonged exposure, and now other materials are being examined.

We have found that a mask with circular holes, pressed in contact with the actinometer paper whilst it is being exposed behind the wedge, ensures the production of a sharp line of demarcation between the faded and unfaded areas, and consequently greater ease of estimation of contrast, as well as the elimination of objectionable optical effects due to the proximity of areas of different depths of color. The wedge has now taken its final form, and a modified viewing box has been designed to accommodate the faded sample side by side with the step-faded standard paper, thus facilitating contrast matching.

. . . . . .

Although reference has been made to it, we have so far not discussed a difficulty which will inevitably arise in the measurement of light-fastness of colored papers dyed with a mixture of fast and traces of fugitive dyestuffs. With such papers it is apparent that to attempt to allot a fastness value from the period at which fading begins would be definitely misleading, since such a paper would be recorded as equally or even more fugitive than another paper of the same shade which had been dyed entirely with fugitive dyes, in spite of the fact that further exposure would have no effect on the one, whilst completely fading the other. For a limited number of commercial purposes, where no fading at all is permissible, two such papers might be equally unsuitable; but for the majority of requirements, a paper which slightly fades only during the first few hours of exposure and then remains permanently fast, is much to be preferred.

The difficulty could possibly be overcome by specifying two or more exposure periods, provided an entirely satisfactory fading lamp were available, but in the absence of such a lamp a practical solution is not so obvious. Even were a lamp available, the occurrence of anomalies would be common, since the colors used in most colored papers are so composite that fading is bound to occur at many different rates.

We have not yet made such progress as to warrant a detailed investigation of the possibility of overcoming this difficulty by modifications in the conditions of exposure, and desire at this stage to do little more than draw attention to the existence of the difficulty. Possibly the solution will ultimately lie in the realization by the paper user of the conditions which the paper must fulfill in practice, and a specification of fastness made accordingly.

In regard to another variable which may appreciably affect fastness to light, namely, relative humidity, it will certainly behoove the user to consider the conditions under which the paper is to be put. It is quite conceivable, for instance, for a papermaker to match the fastness of a given sample, so long as the exposure test is carried out at a normal range of humidity, yet, if the fastness of the dyes employed is more affected by humidity than that of those used in the pattern to be matched, the making may be defective in practice if it is exposed, as, say, poster papers are, to sunlight while saturated with water, that is, at 100 per cent relative humidity. In the case of papers intended for such a purpose, it will obviously be necessary to specify not only the light-fastness, but the relative humidity (if it differs from the normal range) under which the fastness tests must be carried out. Here again, therefore, as in the cases of "topped" papers, and papers dyed in pale shades, usage requirements will have to be borne in mind when the fastness of such papers is being specified.

Sulphite Pulp Supplies Reduce Quotas

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 11, 1938—At a meeting of the Sulphite Pulp Suppliers held in Stockholm recently it was decided in view of market conditions to reduce export quotas by 20 percent, according to a report from the office of the American Commercial Attache, Stockholm. At the same time a committee is stated to have been organized to report upon a suggested revision of existing SPS agreement with a view to its continuation after the present expiry date at the end of 1938.

The Sulphite Pulp Suppliers is an organization formed by sulphite producers of Norway, Sweden, Finland, Czechoslovakia, Germany, Austria and Memel. Its object is to promote stabilization of the sulphite pulp market by the establishment of export quotas in order to prevent the offering of too large quantities on the international market. It is estimated that 90 to 95 percent of the total European production of sulphite pulp for export is under the control of the organization.

Canadian Technical Section to Meet

The Technical Section of the Canadian Pulp and Paper Association will meet on June 9, 10 and 11, 1938 at Cornwall, Ont. On Thursday, June 9, there will be visits to the electrolytic chlorine plant, the soda, sulphite and paper mills of the Howard Smith Paper Mills, Ltd.; the viscose rayon plant of Courtaulds, Ltd., and to the deinking plants and paper mill of the Mille Roche Mill of Provincial Paper Ltd.

There will be a luncheon at the Cornwallis Hotel, Cornwall, Ont. Following this buses will leave at 5 P. M. for the Seigniory Club, Montebello, P. Q. On Friday, June 10, there will be a visit to the newsprint mill of the James Maclaren Company, Ltd., at Masson, Ont.; Ayers, Ltd.; E. B. Eddy Company, Hull, P. Q., and the mill of the International Paper Company at Gatineau, P. Q. There will also be a golf tournament for the R. A. McInnis trophy. Members of TAPPI and the superintendents association are invited.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 11, 1938—The Government Printing Office has received the following bids for 10,000 pounds (10,000 sheets) of 28 x 38, No. 50 strawboard; Old Dominion Paper Company, 1.444 cents (chipboard); Mathers-Lamm Paper Company, 3.48 cents; Walker, Goulard, Plehn Company, 3.375 cents.

For 5,000 pounds (52,000 sheets) of 25 percent rag, 20 x 25 sage antique coverpaper; Stanford Paper Company, 9.75 cents; Whitaker Paper Company, 9.92 cents; R. P. Andrews Paper Company, 9.79 cents; Barton, Duer & Koch Paper Company, 10.77 cents; and Walker, Goulard Plehn Company, 9.71 cents.

May 17, 1938 Vol 106 #19

The Use of Caustic Soda in the Bleaching of Wood Pulp*

By George E. Schmidt,[1] Brian L. Shera[2] and T. W. Toovey[3]

Abstract

A study to determine effects obtainable through use of caustic soda in the bleaching of pulp.

In these experiments, three west coast pulps made from western hemlock were studied. 1. Kraft pulp of moderate bleachability, 2. Sulphite of high bleachability, and 3. Sulphite of low bleachability. The study was conducted to determine the value of caustic soda in the refining of these pulps. The pulps were first chlorinated so that practically all chlorine was consumed in one hour retention period. The chlorinated pulp was thoroughly washed in the acid state and then neutralized to pH of 7.1 to 7.2 with caustic soda in order to have all chlorinated pulp samples in the same neutral state for further treatment. Causticizing was conducted at various concentrations, temperatures and consistencies for a period of one hour. This pulp was washed free of excess caustic soda and bleached with calcium hypochlorite. So that results derived from the caustic treatment would remain paramount usually no attempt was made to bleach to a high white color. In the bleaching stage, the bleachability was determined by the permanganate method of Wiles and only the equivalent amount of chlorine as hypochlorite was added. The bleaching action was stopped in about three hours or at a point where the residual chlorine was ¼ to ½ per cent. Since there was no excess chlorine added, the bleaching action was mild and the variations derived from caustic soda treatment of the pulp were in evidence in the final product.

Laboratory Methods

The methods of testing used were, as follows:

Bleachability. The permanganate method by Wiles. *Tech. Assoc. Papers* 16:93-95 (June 1933); 17:146-148 (June 1934).

pH. By means of an instrument equipped with glass and calomel electrodes.

Residual chlorine. The residual chlorine remaining in the chlorination or bleaching stages was determined by the usual method employing sodium thiosulphate, acid, potassium iodide and starch indicator.

K-number. This is an arbitrary designation given to a method used in determining the dissolved organic matter or incrustants to be found in solution at any time during the chlorination, causticizing or bleaching stages. It appears to offer a means of gauging the speed or completeness of a pulp refining action but as yet it has not been fully developed to determine quantitatively the dissolved incrustants in terms of lignin, etc. However, the number increases proportionately with the effectiveness or completeness of the refining action. The number is determined by the reducing action of an aliquot portion of the solution surrounding the pulp on a standard permanganate solution. The figures in this article express the cc. of 0.1N $KMnO_4$ reduced by the incrustants removed from one gram of pulp.

Bursting strength. The beating was carried out according to TAPPI Standard T 403m-36. The sheets were dried on a hot plate and burst in a Mullen tester immediately. The tests are based on a ream size of 24 x 36 inches—480.

Tearing test. Run on the Elmendorf tear tester under standard conditions of temperature and humidity. The results are reported as grams per pound per ream (T 414m-35).

Folding test. Run on the M.I.T. folding tester under TAPPI standard conditions of temperature and humidity. The results are based on double folds M.I.T. (T 423m-36).

Freeness. Run under standard conditions with a Schopper-Riegler Freeness Tester.

Chemical analysis. Standard TAPPI methods were employed for determining alpha cellulose, copper number, viscosity and ash content. (T 203m-36; T 215m-38; T 206m-35; T 211m-36 respectively).

Color. The pulp colors were determined on standard color wheels.

Pulp Refining Procedure

All of the pulps were received in sheet form from the manufacturers and weighed into equal portions for treatment. The air-dry basis was used throughout except where noted otherwise. The pulp sheets were soaked and thoroughly disintegrated. The procedures used on the pulps were, as follows:

1. KRAFT PULP. Bleachability 8.60 per cent. 6.0 per cent chlorine was added over a period of 25 minutes to the pulp suspension at 3 per cent consistency and 65 deg. F. After the chlorine was added, the reaction was allowed to proceed 60 additional minutes.

Time	Chlorine Consumed, Per cent	K. Number	pH
0			
25	5.13	5.7	1.70
40	5.57	8.7	1.60
55	5.73	11.6	1.58
70	5.79	...	1.57
85	5.85	14.0	1.55

Washing. Washed in acid state on suction box. Three washes of 2.5 gallons per pound. Total water 7.5 gallons per pound. Temperature 50 deg. F. pH of washed pulp 3.7. Bleachability, 3.60 per cent.

Neutralizing. Temperature 50 deg. F. NaOH added 0.37 per cent. pH raised to 7.1. Bleachability 3.37 per cent. Pulp not washed.

Causticizing and bleaching. See Table I.

Washing. Same as chlorinated pulp.

2. *Hard Sulphite Pulp.* Bleachability, 6.60 per cent. 4.64 per cent chlorine was added during a 25 minute

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1], [2] Pennsylvania Salt Manufacturing Co. of Washington, Tacoma, Wash.

[3] Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.

TABLE I.—TABULATION OF PULP TREATMENTS AND TESTS

Type of Pulp	Test No.	Causticizing Stage 1 Hour: Per cent Consistency	Temp., Deg. F.	Final pH	Final "K" No.	Per cent NaOH Added	Per cent NaOH Consumed	Bleachability after Causticizing	Bleaching Stage: Time, Hours	Temp., deg. F.	Per cent Consistency	Final pH	Final "K" No.	Per cent NaOH Added	Per cent Cl₂ Added	Per cent Cl₂ Consumed	Chemicals Applied: Per cent Chlorine	Per cent Caustic Soda	Per cent Total	Physical and Chemical Tests: At Max. Mullen: Max. Mullen	Time, Min.	Freeness	Tear, gm./lb./ream	Fold, M.I.T.	Ash, Per cent	Color (Std. Wheel)	Copper No.	Per cent Alpha Cel.	Viscosity, Cps.
Kraft	Unbleached A	9	77	9.7	4.6	0.50	0.48	3.09	3.0	90	12.0	7.7	6.7	0.74	3.09	2.72	9.09	1.61	10.70	190	100	418	3.35	3877	0.542	72.6	92.42	0.62	72.6
	B	9	77	10.5	4.6	1.00	0.95	2.89	3.5	90	12.0	7.9	4.3	0.81	2.89	2.39	8.89	2.18	11.07	157	60	475	2.58	1350	0.609	11.6	87.25	2.54	11.6
	C	9	77	11.7	5.1	2.00	1.85	2.79	3.0	90	12.0	7.8	4.7	1.03	2.79	2.34	8.79	3.10	12.19	161	80	490	2.41	1758	0.613	12.9	86.76	2.80	12.9
	D	9	104	9.2	5.3	0.50	0.49	2.71	3.0	90	12.0	7.8	4.3	0.88	2.71	2.17	8.71	1.25	10.46	167	60	490	2.51	1800	0.754	15.8	88.74	1.26	15.8
	E	9	104	9.6	7.5	1.00	0.99	2.55	3.0	90	12.0	7.7	5.4	0.88	2.55	2.18	8.43	3.25	11.68	174	60	430	2.61	1900	0.560	13.9	88.85	1.38	13.9
	F	9	104	11.7	8.8	2.00	1.91	2.43	3.0	90	12.0	7.7	5.2	0.88	2.43	2.08	8.43	3.25	11.68	164	60	615	3.12	1915	0.586	**16.7**	**89.25**	**1.16**	**16.7**
	G	9	140	7.4	7.5	0.50	0.50	2.91	3.0	90	12.0	7.8	4.9	1.18	2.91	2.54	8.91	2.05	10.96	154	60	730	2.84	1865	0.527	14.8	89.24	1.12	14.8
	H	9	140	9.8	8.6	1.00	0.99	2.43	3.0	90	12.0	7.8	4.7	0.88	2.43	2.10	8.43	2.25	10.68	158	60	800	2.71	1768	0.599	19.5	89.26	1.12	19.5
	I	9	140	11.8	10.3	2.00	1.87	1.94	3.5	90	12.0	7.8	3.8	0.74	1.94	1.61	7.94	3.11	11.05	166	80	557	2.72	2614	0.467	17.8	89.50	1.11	17.8
	J	15	77	9.8	6.3	1.00	0.93	2.31	3.0	90	12.0	7.9	4.2	0.81	2.31	1.92	8.31	2.35	10.49	169	80	530	3.00	2534	0.384	17.5	90.00	0.92	17.5
	K	15	77	11.4	8.3	2.00	1.46	2.17	3.0	90	12.0	8.0	3.7	0.88	2.17	1.77	8.17	3.25	11.42	173	80	696	2.65	2505	0.384	20.4	88.25	1.05	20.4
	L	15	104	9.8	8.7	1.00	0.94	2.11	3.5	90	12.0	7.9	4.8	0.74	2.11	1.78	8.11	3.11	11.22	160	80	609	2.73	2579	0.314	15.8	89.13	0.95	15.8
	M	15	104	11.4	9.5	2.00	1.48	2.25	3.5	90	12.0	7.7	3.5	0.74	2.25	1.86	8.25	3.18	11.43	168	80	591	3.08	2640	0.294	18.2	89.50	0.97	18.2
	N	15	140	9.5	10.2	1.00	0.96	2.11	3.0	90	12.0	8.3	3.8	0.81	2.11	1.77	8.11	2.96	11.07	162	80	594	3.22	2800	0.242	18.1	90.00	0.95	18.1
	O	15	140	11.7	11.4	2.00	1.40	1.71	3.5	90	12.0	8.9	3.5	0.59	1.71	1.36	7.71	2.96	10.67	172	80	633	2.58	2919	0.289	19.5	88.70	0.84	19.5
	P	15	140		Neutralized Only			3.37	1.5	90	12.0	8.7	9.2	1.77	3.37	3.02	9.37	2.94	11.51	183	80	640	2.70	2944	0.205	19.5	89.97	0.92	19.5
	Q				Neutralized Only			3.37				3.5	9.1	0	3.37	3.36	9.37	0.37	9.74	171	80	588	2.19	2430	0.268	19.5	89.72	0.97	19.5
	R				Multistage Bleaching			3.37												142	80	354	1.82	978	0.265	6.8	78.85	4.53	6.8
Hard Sulphite	Unbleached S				Neutralized Only			0.79	1.5	80	14.0	6.9	1.0	0	0.79	0.51	5.43	0.06	5.49	151	100	340	1.82	2840	0.208	16.5	89.24	1.19	16.5
	T				Neutralized Only			0.79	2.2	80	14.0	7.7	1.5	0.46	0.79	0.51	5.43	0.52	5.95	118	60	620	2.27	2703	0.331	72.4	89.50	2.02	72.4
	U	15	140	9.0	3.0	0.50	0.49	0.30	2.2	80	14.0	7.8	0.4	0.07	0.30	0.22	4.94	0.63	5.57	119	50	764	3.03	1587	0.168	30.5	88.65	2.42	30.5
	V	15	140	11.1	3.6	1.00	0.67	0.22	2.2	80	14.0	7.9	0.3	0.09	0.22	0.17	4.86	1.15	6.01	123	50	872	2.67	1521	0.176	37.6	89.45	1.84	37.6
Soft Sulphite	Unbleached W	8	180	11.3	13.3	1.50	1.46	0.79	3.0	77	15.0	9.2	1.5	0.49	0.79	0.62	3.34	2.01	5.35	111	60	647	2.22	580	0.206	86.1	90.31	0.87	86.1
	X	8	180	11.7	9.1	2.00	1.90	0.83	2.0	77	15.0	8.4	1.6	0	0.75	0.55	3.47	2.21	5.68						0.158	36.6	91.90	1.27	36.6
					Second Stage Bleach				3.0	80	8.0	7.9	0	0	0.17	0.07									0.145	40.3	89.82	1.47	40.3

period and allowed to react an additional 60 minutes. Consistency 3.0 per cent. Temperature 68 deg. F.

Time	Chlorine Consumed, Per cent	K. Number	pH
0			
25	3.90	34.4	1.85
40	4.28	37.3	1.80
55	4.33	37.3	1.75
70	4.40	38.5	1.75
85	4.49	40.0	1.75

Washing. Washed in acid state on suction box. Three washes of 2.5 gallons per pound or total water consumption of 7.5 gallons per pound. Temperature 50 deg. F. Bleachability 0.88 per cent.

Neutralizing. Temperature 50 deg. F. NaOH added 0.06 per cent pH raised to 7.2. Bleachability 0.79 per cent. Pulp not washed.

Causticizing and Bleaching. See Table I.

Washing. The same method as the chlorinated stock.

3. *Soft Sulphite Pulp.* Bleachability 3.64 per cent. 2.55 per cent chlorine added during a 25 minute period and allowed to react an additional 60 minutes. Consistency 3 per cent. Temperature 68 deg. F.

Time	Chlorine Consumed, Per cent	K. Number	pH
0			
25	2.44	23.9	1.85
40	2.48	23.9	1.80
55	2.49	24.3	1.80
70	2.50	25.9	1.80
85	2.51	26.3	1.80

Washing. Washed in acid state on suction box. Three washes of 2.5 gallons per pound or total water consumption of 7.5 gallons per pound. Temperature 50 deg. F. pH of washed pulp 6.8.

Neutralizing. Temperature 50 deg. F. NaOH added 0.02 per cent. pH raised to 7.1. Bleachability 1.65 per cent. Pulp not washed.

Causticizing and bleaching. See Table I.

Washing. Same method as the chlorinated pulp.

Discussion

In general it may be said that these experiments showed that the use of caustic soda improved the physical and chemical properties of the pulp tested. The consumption of caustic soda reduced the consumption of chlorine and improved the final product.

A study of this experiment (Fig. I) indicates that a caustic soda treatment of between 1 to 2 per cent on kraft and 0.5 to 1 per cent on sulphite in the causticizing stage at moderate temperature and high consistency produced a pulp of higher color and quality. Note kraft tests K to O and sulphite tests U and V. On kraft pulp it appeared that a density of 15 per cent was preferable to medium density

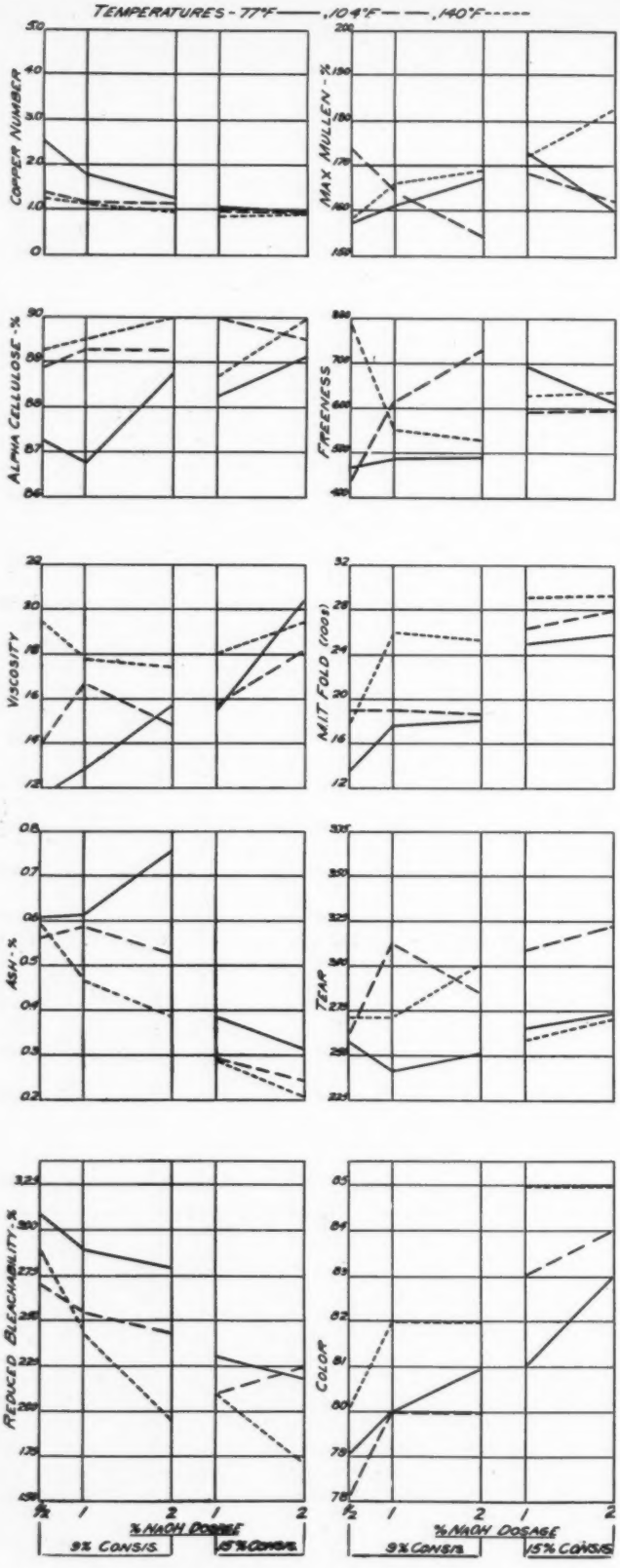

FIG. 1.
Graphs of Physical and Chemical Tests

of 9 per cent, in the causticizing stage. The ash content dropped appreciably in the high density causticizing and in all cases showed a decrease from the unbleached pulp in both kraft and sulphite. The value was lower with increased temperatures and with increased caustic dosage. The copper number was lowered with each increase of temperature or caustic dosage. The color, freeness, fold, copper number, alpha cellulose and viscosity also showed generally improved values. See tests J to O.

The bleached kraft and sulphite pulps all showed increased freeness when compared to the unbleached pulp.

The mullen tests compared with the unbleached sample, show a slight increase in the case of the sulphite pulp and a loss of 25 to 30 points in the case of kraft pulp. The variation of the mullen in relationship to the caustic concentration and temperature are not sufficiently marked to draw definite conclusions in these tests.

However, previous work has shown that an increase in mullen in the finally bleached pulp can be expected with moderate temperatures and caustic concentrations.

On sulphite the tear showed a general increase with the caustic concentration.

The fold on kraft pulp showed a definite improvement with increased caustic concentration and temperature, whereas on sulphite, the fold decreased with increased caustic treatment.

The alpha cellulose content of the kraft pulp showed a slight corresponding increase with increased temperature and caustic treatment. The hard sulphite exhibited a linear increase in alpha cellulose with increased caustic treatment. Test W in the soft sulphite shows a high alpha cellulose content and good color can easily be attained by caustic treatment.

The viscosity of the kraft pulp was higher in tests where temperatures and caustic concentration were increased. The viscosity of the sulphite pulps was higher with increased caustic concentration at the same temperature. Kraft pulps are generally conceded to have lower viscosity than sulphite pulps when given the same degree of refining.

Some of the tests from this experiment require special discussion.

Test P was chlorinated washed and neutralized only. It was not given a causticizing treatment, but sufficient caustic soda was added in the bleaching stage to maintain an alkaline condition throughout the bleaching operation. A product resulted which was generally inferior to the causticized pulps, in spite of the greater amount of chemicals consumed in comparison to tests K to O.

Test Q was chlorinated, washed and neutralized only. No caustic soda was used in the bleaching stage with the result that the pH dropped far into the acid range. The final product was very low in color and tests showed the physical and chemical characteristics were adversely affected.

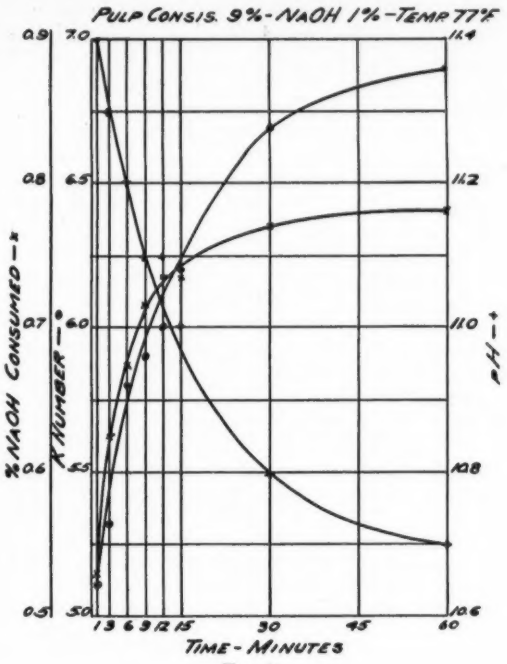

FIG. 2.
Kraft Pulp Causticizing Curves

Test R resulted in a high color obtained by chlorination, causticizing and two bleaching stages. Other characteristics were generally inferior to those found in some of the other tests.

Test S is a sulphite pulp chlorinated, washed and neutralized. No caustic soda was used in the bleaching stage which allowed the pH to pass slightly to the acid side at the end of the bleaching. The color was very low, but the other qualities were not greatly impaired.

Test T was the same as Test S except that caustic soda was used to maintain an alkaline pH during bleaching. A pulp of excellent color and quality was obtained though not as good as U or V, which were given a separate causticizing treatment.

Test X, soft sulphite, with the stronger caustic treatment and two stage bleaching, did not measure up to expectations when compared to test W. Since X shows a slightly higher bleachability after causticizing and lower color and alpha cellulose but higher copper number after bleaching, it might be assumed that the pulp was adversely affected at two points.

1. Too much air might have been present during the high temperature causticizing.
2. The excess bleach liquor used in the two bleaching stages might have had something to do with it.

Interesting observations were made during the causticizing treatments which are clearly illustrated in Fig. 2. The speed of the reaction of the caustic soda with the neutralized pulp is very rapid giving a steep reaction curve during the first few minutes similar to the curves plotted on the chlorination of pulp. Even though the caustic consumption after ½ hour is negligible, the K. number continued to increase and the pH to decrease up to 1 hour. It would seem that a secondary reaction continues independent of the consumption of caustic soda.

Acknowledgment

The authors make grateful acknowledgment of the cooperation received from the British Columbia Pulp and Paper Co., Vancouver, B. C., St. Regis Kraft Company, Tacoma, Wash., Soundview Pulp Company, Everett, Wash., and the Pulp Division, Weyerhaeuser Timber Company, Everett and Longview, Wash.

Review Of The Paper Industry Literature

Abstracts Compiled By the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman.

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Cellulose and Lignin

Deformation Mechanism and Fine Structure of Hydrate Cellulose. II. Deformation Mechanism, Selling Anisotropy and Mechanical Properties of Highly Swollen Cellulose Hydrate Gels. P. H. Hermans and A. J. de Leeuw. Kolloid-Z. 81, no. 3: 300-326 (Dec., 1937); B. I. P. C. 8:222.—Cellulose gels seem to be made up of rather long, rod-shaped micelles, which swell more strongly in their breadth than in their length direction. The changes in swelling volume in the different directions furnish an index of the orientation of the micelles. Such measurements of the swelling anisotropy under various tensions support the theory that the rods are arranged in groups at node points of a network structure. Stretching results in an orientation into a crystalline type, and subsequent shrinking may restore the original state, unless the micelles are held together at new points of contact by the same forces which bind the chains themselves. Various studies of cellulose xanthate threads and hydrated cellulose threads include the double refraction as a function of tension, and the force-extension diagram of isotropic cellulose threads.—C.J.W.

Molecular Size of Cellulose From Different Sources. I. J. K. Chowdhury and T. P. Bardhan. J. Indian Chem. Soc. 13: 240-252 (1936).—From a quantitative study of the molecular weight and viscosity of solutions of celluloses from different sources it is evident that they are not identical and that their different physical properties are inherent to the size of the molecule and not due to physical conditions. In Schweitzer's reagent cotton, jute and bamboo were found to be composed of 978, 516 and 189 anhydroglucose units. In viscose the cellulose is somewhat disintegrated, cotton, jute, and bamboo consisting of 894, 468 and 158 anhydroglucose units, respectively, while in acetylation cotton consists of 138 and jute of 86 glucose residues. Treatment with 42 per cent hydrochloric acid at 0° C. carried disintegration still further, molecules of cotton and jute being found to consist of 13 and 9 glucose units,

respectively. The number of glucose units in native cotton cellulose is higher, being calculated as over 1000 units by the use of Staudinger's formula.—A.P.-C.

The Action of Sodium Hypoiodite on Cellulose. L. Brissaud. Mém. Poudres 27: 214-229 (1937).—In comparing the action of hypoiodite on glucose which is quantitatively converted into gluconic acid, with its action on cellulose, in which the CHO groups are supposed to be oxidized, it was found that successive treatments with hypoiodite used up a much larger amount of iodine than could be accounted for by an oxidation reaction. As a result of tests on celluloses oxidized with hypochlorite and cellulose degraded with dilute hydrochloric acid, it is concluded that there is a degrading action due to oxidation and a physical action on the surface of the cellulose micelles which is responsible for the high value found. The method does not give an indication of the molecular weight of cellulose.—A.P.-C.

The Oxidation of Cellulose. L. Brissaud. Mém. Poudres 27: 195-213 (1937).—By the oxidation of cellulose at 14 deg. C. in the dark with a neutral solution of sodium hypochlorite, five samples of increasing oxidation were obtained. Physical tests on these samples gave the following results: the copper and iodine numbers indicated that the reducing power of the cellulose increased with increasing oxidation, which is different from the behavior of cellulose hydrolyzed by acids. The methylene blue number was a function of the degree of oxidation. X-ray examination showed that the diagram is a superposition of methylene blue on the diagram of the original cellulose, an absorption phenomenon. The per cent of alpha-cellulose decreased with the degree of oxidation, while even under the most drastic conditions, very small amounts of glucuronic, gluconic or saccharic acids were formed. The per cent of ash increased with the degree of oxidation, the ash being alkaline and fusible. By extraction with hot water or cold dilute solution, cellulose was obtained with a very high iodine number with properties similar to those of cellulose degraded by acids.—A.P.-C.

Transformation of Hydrated Cellulose Into Native Cellulose. Kurt H. Meyer and N. P. Badenhuizen, J. Nature 140: 281-282 (1937).—When strongly stretched hydrated cellulose (viscose rayon) is heated 30 min. at 200 deg. C. in water or formamide, it is changed into native cellulose as shown by x-ray diffraction patterns. At 200 to 300 deg. C. native cellulose is the stable form and hydrate cellulose is the nonstable.—A.P.-C.

Lignin and Related Compounds. XXXII. The Guaiacyl and Syringyl Groups in Various Woods. W. Lincoln Hawkins, Geo. F. Wright and Harold Hibbert. J. Am. Chem. Soc. 59: 2447-2448 (Nov., 1937).—Whereas lignisulphonic acids from soft woods, on treatment with hot aqueous alkali, yields only vanillin, those from hard woods give approximately equal quantities of vanillin and syringaldehyde (2.8 per cent of each calculated on the weight of the lignin). These have been isolated from the sulphite waste liquor and in the case of oak, from the isolated lignin. Data are given for yellow birch, white oak, aspen, maple (maple sap and heart wood), spruce, hemlock and balsam.—A.P.-C.

Diffraction of X-Rays at Very Small Angles By Celluloses and Rayons. G. L. Clark and E. A. Parker. Science 85: 203-204 (1937).—Diagrams of the diffraction effects of native ramie, mercerized ramie dried under tension and regenerated cellulose rayons are reproduced and discussed.—A.P.-C.

The Available Surface of Cellulose. O. Rhys Howell and Albert Jackson. J. Chem. Soc. 1937: 979-982.—Absorbent paper made from pure cotton cellulose was impregnated with solutions of cobalt chloride by putting 1.5 cc. of solutions of varying concentrations on uniform pieces having an area of 10 sq. in. Absorption spectra were taken from lines: 6850, 6660, 6250, 6100 and 5250 Ansstrom units for impregnation by solutions whose normalities varied by 0.05 unit from 0.05 to 0.40 and 0.50, 0.80, 1.00, 1.50 and 2.00. All absorption lines showed a rapid uniform increase of extinction coefficient up to 0.24 *N*, a transition from 0.24 *N* to 0.70 *N* and a slow uniform increase above 0.70 *N*. If a unimolecular layer of cobalt chloride is assumed at 0.25 *N* the surface available per g. of fibers is 1.35×10^5 sq. cm. The surface calculated from the dimensions of the fibers is 1.6×10^3 sq. cm. or 1/85 of the surface available for adsorption of cobalt chloride. The surface may not be fully covered or the layer may be multimolecular. If the ellipsoidal granules of cellulose 1.5 x 1.1 are considered as smooth units furnishing the surface for adsorption the area is calculated to be 3.10×10^4 sq. cm. per g., which is 1/4.4 of the available surface. The number of cobalt chloride molecules adsorbed per g. of cotton fiber before the break in the curve representing the extinction coefficient is about 10 times as great as the number of molecules of vat dyes, e.g., Ciba blue.—A.P.-C.

Oxycellulose Research. J. Dumas. Rev. Gén. Mat. Color. 41: 381-382 (1937).—The use is described of Nessler's solution (10 g. of mercuric iodide, 5 g. of potassium iodide and 20 g. of sodium hydroxide dissolved in 100 cc. of water) to detect oxycellulose by observing the intensity of the resulting yellow-orange coloration which ultimately may veer towards the gray. This reaction is due to the aldehydic function of oxycellulose. Tables are given ranging from virgin cotton showing a mild yellow after 30 mins. contact, to oxycellulose (copper number 4.15) showing a deep gray in the same time.—A.P.-C.

Certain Colloidal Reactions of Cellulose Membranes. Wanda K. Farr. J. Phys. Chem. 41: 987-995 (1937).—The cellulose component of the cell membrane of the cotton fiber is in the physical form of small uniform sized ellipsoid particles. These are held together by a glue-like material in single rows end to end to form the fibril, the fibrils in turn to form the lamellae, and the lamellae to form the membrane. The cementing material does not react positively to tests for cellulose. The colloidal behavior of the membrane may be due primarily either to the reaction of the cementing material, the cellulose particles, or to the combined reactions of the two membrane components with the particular reagent used.—A. P.-C.

Cellulose Analysis. A Comparison of Three Principal Methods. J. David Reid and D. F. J. Lynch. Ind. Eng. Chem., Anal. Ed. 9: 570-573 (Dec., 1937).—Cellulose was determined in a number of materials by the Cross and Bevan, the Norman and Jenkins, and the Kürschner and Hoffer methods. The Kürschner-Hoffer method gives a smaller yield of "crude" cellulose than the other two methods, but it is purer; it is suggested that this may be due to removal of the pectic layer by the nitric acid used and the oxalic acid produced during the Kürschner-Hoffer reaction. The method is approximately twice as fast as either of the other two.—A.P.-C.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING MAY 7, 1938

SUMMARY

Cigarette paper .....3 cs.
Wall paper .....10 bxs., 1 cs.
Paper hangings .....3 bls.
Newsprint .....4,863 rolls
Printing paper .....62 rolls, 74 cs.
Kraft paper .....82 rolls
Wrapping paper .....152 rolls, 90 pkgs.
Drawing paper .....2 cs.
Filter paper .....4 cs.
Decalcomanias .....3 cs.
Surface coated paper .....4 cs.
Metal paper .....18 cs.
Photo paper .....1 cs.
Colored paper .....6 cs.
Tissue paper .....1 cs.
Tracing cloth .....27 cs
Paper tubes .....43 ctns., 66 cs.
Miscellaneous paper .....23 cs.

CIGARETTE PAPER

De Mauduit Paper Corp., *Normandie,* Havre, 3 cs.

WALL PAPER

S. K. Lonegren, *Gripsholm,* Gothenburg, 10 bxs.
——, *Europa,* Bremen, 1 cs.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Farmer,* London, 3 bls.

NEWSPRINT

N. Y. Evening Journal, *Markland,* Liverpool, N. S., 189 rolls.
N. Y. Tribune, *Markland,* Liverpool, N. S., 1502 rolls.
World Telegram, *Markland,* Liverpool, N. S., 578 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 561 rolls.
H. G. Craig Co. Inc., *A.C.D.,* Donnacona, 301 rolls.
H. G. Craig Co. Inc., *G.D.D.,* Donnacona, 412 rolls.
International Paper Co., *International #1,* Gatineau, 308 rolls.
Lunham & Reese, Inc., *Carolina Thorden,* Kotka, 170 rolls.
Jay Madden Corp., *Carolina Thorden,* Kotka, 557 rolls.
Perkins Goodwin & Co., *Hansa,* Hamburg, 285 rolls.

PRINTING PAPER

L. A. Consmiller, *Europa,* Bremen, 49 cs.
L. A. Consmiller, *Hansa,* Bremen, 12 cs.
——, *American Farmer,* London, 62 rolls, 13 cs.

KRAFT PAPER

The Borregaard Co., Inc., *Gripsholm,* Gothenburg, 82 rolls.

WRAPPING PAPER

The Borregaard Co. Inc., *Gripsholm,* Gothenburg, 152 rolls, 90 pkgs.

DRAWING PAPER

H. Reeve Angel & Co. Inc., *American Farmer,* London, 2 cs.

FILTER PAPER

H. Reeve Angel & Co. Inc., *American Farmer,* London, 4 cs.

DECALCOMANIAS

Sellers Transportation Co., *Hansa,* Hamburg, 3 cs.

SURFACE COATED PAPER

Hensel Bruckman & Lorbacher, *Hansa,* Hamburg, 4 cs.

METAL PAPER

K. Pauli Co., *Hansa,* Hamburg, 18 cs.

PHOTO PAPER

Medo Photo-Supply Co., *Carinthia,* Liverpool, 1 cs.

COLORED PAPER

Lansen Naeve Corp., *Hansa,* Bremen, 6 cs.

TISSUE PAPER

M. Snedeker Corp., *American Farmer,* London, 1 cs.

TRACING CLOTH

Chas. Bruning Co. Inc., *Hansa,* Bremen, 27 cs.

PAPER TUBES

——, *Hansa,* Bremen, 43 ctns, 66 cs.

MISCELLANEOUS PAPER

Steiner Paper Corp., *Gripsholm,* Gothenburg, 10 cs.
Coty Processing Co., *Normandie,* Havre, 2 cs.
L. R. Sartorius, *Normandie,* Havre, 1 cs.
T. N. Faribanks, *Komaki Maru,* Yokohama, 10 cs.

RAGS, BAGGINGS, ETC.

American Express Co., *Robert Maersk,* Antwerp, 112 bls. rags.
Castle & Overton, Inc., *City of Flint,* Dundee, 75 bls. paper stock.
Chase National Bank, *Jean Jadot,* Antwerp, 117 bls. paper paste.
D. M. Hicks, Inc., *Jean Jadot,* Antwerp, 39 bls. paper paste.
Chase National Bank, *Artigas,* Manchester, 44 bls. hemp waste.
Bank of N. Y. Trust Co., *Hansa,* Hamburg, 70 bls. rags.

OLD ROPE

Banco Com'l Italiane Trust Co., *American Farmer,* London, 37 bls.

WOOD PULP

Price & Pierce, Ltd., *Gripsholm,* Gothenburg, 379 bls. unbleached sulphite.
——, *Vulcania,* Trieste, 280 bls. wood pulp.
Absorbo Beer Pad Co., *Vulcania,* Trieste, 510 bls. wood pulp.
Castle & Overton, Inc., *Carolina Thorden,* Wiipuri, 265 bls. bleached cellulose.
Pulp Sales Corp., *Carolina Thorden,* Wiipuri, 881 bls. sulphate.
Pulp Sales Corp., *Carolina Thorden,* Wiipuri, 2032 bls. sulphite.
Pulp Sales Corp., *Carolina Thorden,* Kirkkoniemi, 2650 bls. sulphite.
Pulp Sales Corp., *Carolina Thorden,* Kotka, 665 bls. sulphite.
Bank of N. Y. Trust Co., *Hansa,* Hamburg, 210 bls. wood pulp 42 tons.

WOOD PULP BOARDS

Oliner Fibre Co., *Gripsholm,* Gothenburg, 4 bls.
Fibre Case & Novelty Co. Inc., *Gripsholm,* Gothenburg, 25 bls.
H. Fuchs & Son, *Gripsholm,* Gothenburg, 10 crates.

NEWARK IMPORTS

WEEK ENDING MAY 7, 1938

H. G. Craig Co. Inc., *Donpaco,* Donnacona, 327 rolls newsprint.

PORTLAND IMPORTS

WEEK ENDING MAY 7, 1938

Price & Pierce, Ltd., *Brosund,* ——, 300 bls. unbleached sulphate.
Pagel Horton & Co. Inc., *Brosund,* Sweden, 3165 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING MAY 7, 1938

Gottesman & Co. Inc., *Brosund,* Sweden, 2875 bls. unbleached sulphite.

Parsons & Whittemore, Inc., *Chemnitz,* ——, 1000 bls. woodpulp.

PHILADELPHIA IMPORTS

WEEK ENDING MAY 7, 1938

J. W. Hampton Jr. & Co., *City of Flint,* London, 1 cs. writing paper.

——, *City of Flint,* Hamburg, 422 rolls wrapping paper.

M. Hastings & Co., *Indep. Hall,* Havre, 1 ble. drawing paper.

N. Schwab & Son, *Artigas,* Manchester, 34 bls. cotton waste.

Pulp Sales Corp., *Caroline Thorden,* Wiipuri, 1016 bls. sulphite.

Pulp Sales Corp., *Caroline Thorden,* Kotka, 696 bls. sulphite.

J. W. Hampton Jr. & Co., *Caroline Thorden,* Kotka, 325 rolls newsprint.

Wilkinson Bros., & Co. Inc., *Caroline Thorden,* Kotka, 68 rolls newsprint.

Jay Madden Corp., *Caroline Thorden,* Kotka, 324 bls. wood pulp boards.

WILMINGTON IMPORTS

WEEK ENDING MAY 7, 1938

Castle & Overton, Inc., *Caroline Thorden,* Wiipuri, 4623 bls. bleached cellulose.

Jay Madden Corp., *Caroline Thorden,* Kotka, 760 bls. wood pulp boards.

Lagerloef Trading Co., *Caroline Throden,* Spjutsund, 1820 bls. mechanically ground pulp.

BALTIMORE IMPORTS

WEEK ENDING MAY 7, 1938

——, *Maria,* Trieste, 250 bls. wood pulp.

Washington Post, *Markland,* Liverpool, N. S., 3124 rolls newsprint.

W. H. Masson, *Black Falcon,* Antwerp, 79 bls. old rope.

NORFOLK IMPORTS

WEEK ENDING MAY 7, 1938

Darmstadt Scott & Courtney, *Black Falcon,* Antwerp, 100 bls. bagging.

NEW ORLEANS IMPORTS

WEEK ENDING MAY 7, 1938

Parsons & Whittemore, Inc., *Meanticut,* ——, 525 bls. wood pulp.

MONTREAL IMPORTS

WEEK ENDING MAY 7, 1938

Pagel Horton & Co. Inc., *Uddeholm,* ——, 10250 bls. wood pulp.

J. T. O'Hara Sales Co. Formed

J. T. O'Hara, formerly of the Amthor Testing Instrument Company has formed his own company to operate as the J. T. O'Hara Sales Company. This organization will sell testing instruments for the pulp and paper industries and is located at 620 East 43rd Street, Brooklyn, N. Y.

Northern N. Y. Paper Men Organize

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., May 10, 1938—A new organization to be known as the Northern New York Paper Manufacturers' Association has been formed with Willard S. Gamble, president of the Brownville Board Company, as president. Other officers elected include Seymour M. Jones, head of the sales department of the Brownville Board Company, secretary; James McCormick, secretary-treasurer of Knowlton Brothers Inc., treasurer, and Harry P. Hanson, supervisor and manager. The purpose of the organization is to make available various grades of paper manufactured in Northern New York to consumers in various parts of the country through quick service and low transportation costs. This will be made possible by several companies in the association pooling shipments to a build-up of carload proportions in order to get the benefit of the lower carload rates, thereby making lower prices to the consumer. It is probable that a forwarding office will be established in this city for the consolidation of shipments, which may be trucked in here for loading aboard the cars destined to certain points, or a car may be started from a mill on the outskirts of the area in the association and stop for fill-up at other mills en route. Among the products to be shipped under the plan will be several grades of coarse papers, office stationery and book papers, cover, tag and various specialties. Companies in the group include the Brownville Board Company, Brownville Paper Company, Dexter Sulphite Pulp and Paper Company, Knowlton Brothers Inc., Taggart Brothers Paper Company, Racquette River Paper Company, Newton Falls Paper Company, Climax Manufacturing Company, St. Regis Paper Company, Latex Fibre Industries, J. P. Lewis Company, Gould Paper Company and National Paper Products Co.

NASHUA DEDICATES BUILDING

(Continued from page 26)

each section can be supplied with air at a reasonable temperature for that section. The ducts for incoming air run north and south and the exhaust ducts run east and west along the north wall. The mechanical equipment for the ventilating consists of a Sturtevant Air Washer, a Kompak Air Filter and several fans. The air is completely changed six times an hour if necessary.

Another important feature is sound proofing. All ceilings have been covered with Johns-Manville Accoustical tile. Venetian blinds are being installed today and the new office building has been equipped with all new steel furniture.

Employed 30 Years

Those who have been with the company for 30 years or more are: 1901, Alice Arnold, Peter Travers; 1904, Guy Pederzani and Joseph Perrault; 1906, Henry Lavoie, William Lavoie, Dennis Moriarity; 1907, Arthur Bourgouin, James Dinan, Hamilton McKay, Thomas Duprey, Julia I. Dobens, and Winthrop L. Carter.

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GUMMED TAPE ROLLS

TICKER TAPE ROLLS

CASH REGISTER ROLLS

ADDING MACHINE ROLLS

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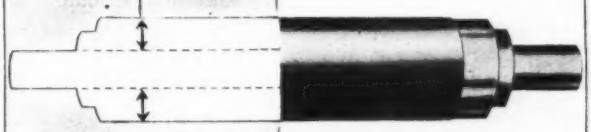
PAPER ROLLS

Shows up soft spots anywhere in the roll from surface through to shaft



Every Waldron Paper Roll undergoes the Waldron Density Test to insure the same uniform hardness throughout as appears at the surface. By thus guarding against "soft spots" anywhere in the roll, maximum life and service are assured to Waldron Roll users.

Waldron Density Tested Rolls are safer to buy and to use.

OVER A CENTURY OF EXPERIENCE BUILDING PAPER CONVERTING MACHINES

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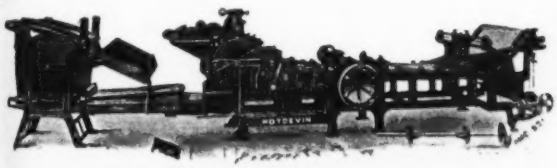

Satchel-bottom paper bag machine

Excerpt from a letter—

". . . we might mention that the POTDEVIN machines installed have given us every satisfaction and have been running continually since installed. The repair bill for these machines has been practically nil. . . .

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PRINTING PRESSES, WAXING MACHINES

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Perforated Screens
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Steel, Copper, Brass
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and Other Alloys
Punched for Centrifugal
and Rotary Screens,
Pulp Washers, Drainer
Bottoms, Filter Plates, etc.

Charles Mundt & Sons
67 Fairmount Ave. Jersey City, N. J.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday May 11, 1938.

Although the decline in the index of general business activity during the past week of about three points has exerted a depressing influence on many industries and trade, the wholesale distributors of paper report little change during the current week. With the exception of an increase in color differentials in sulphite bond and ledger papers, no changes are reported this week.

The demand for newsprint continues to hold up well and shipments are going forward in good volume. No reduction in the prevailing price of $50 per ton has been made by newsprint mills to meet the $48 price announced by the Great Northern Paper Company last week.

Moderate activity is reported this week in some grades of sulphite bond papers. Ground wood papers are holding up well considering the low level of general business. The demand for tissues and all other grades of paper is reported about on the level of the preceding week. The market prices of all grades of paper are unchanged.

Chemical Pulp

The chemical pulp market reports new business as light. Some re-selling is reported to give a little activity to the market, but at the present time mills are reported to be only interested in high quality pulp at under prevailing market quotations.

Mechanical Pulp

The demand for mechanical pulp continues light. Prices and demand are unchanged for the current week.

Old Rope and Bagging

The old rope market continues quiet. Quotations are unchanged for all domestic and foreign grades. There is very little demand for old bagging. Prices are unchanged with the exception of domestic and foreign No. 1 gunny which are quoted at lower prices for the current week.

Rags

The demand for new and old domestic rags continues light. Quotations are unchanged with the exception of the prices of new unbleached rags which are lower this week. The foreign rag market is inactive and prices are nominal.

Waste Paper

The demand for all grades of waste paper continues at so low a level that there is very little business reported in paper stock. Prices continue to remain at prevailing quotations and are practically nominal.

Twine

The twine market reports business as light. Lower prices on many grades of coarse and fine polished and unpolished soft fiber twines are reported for the week.

WRAPPING PAPER DISTRIBUTION DURIN[illegible]37

(Continu[illegible] Page 21)

dents Associatio[illegible]s Spring Meeting on Friday and Satu[illegible]day 6th and 7th at the Ritz-Carlton Ho[illegible]tlantic City, N. J., with a delightful and varied program consisting of Golf Tournament at the Country Club on Friday afternoon, with L. H. Reed of Southern Kraft Corporation, and Joseph Dow of Castle-Overton, Inc., in charge, and on Friday evening a Get-together Party at "The Merry-Go-Round Grill." The business meeting on Saturday morning was conducted by James Fish, Paterson Parchment Paper Company, 2nd vice-chairman; and during the course of the morning the following topics were presented: Sutherland Refiners and some of the results it has accomplished, by Douglas G. Sutherland; Barkon-Frank Daylight Lamp with a demonstration, by T. J. Killian; Interpretation of Freeness and Slowness as it affects Formation, by Arno Nickerson. On Saturday afternoon besides the Ladies' and Men's luncheons, a Question Box was conducted by E. M. Sligh. The Meeting was climaxed by a banquet in the main dining room at 7 o'clock on Saturday evening with William H. Fisher as toastmaster, and Senator Arthur F. Foran of New Jersey, guest speaker. As a grand finale, prizes were presented to the lucky golf winners by L. H. Reed.

Let Contract for Currency Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 11, 1938.—Crane & Co. has been awarded the contract by the Treasury Department for 108,122,000 sheets or approximately 1306 tons of distinctive paper for currency for the fiscal year beginning July 1 next at 38 cents per pound. Crane & Co. holds the present contract at 41 cents. At the opening of bids on May 5, there were no other bidders.

New Super Duty Refractories Booklet

A new twelve-page booklet entitled "How To Reduce Spalling With Super Duty Refractories" has just been published by the General Refractories Company, Philadelphia, Pa. It is attractively printed in two colors and gives charts, tests, and general information on three types of super duty refractories —Hiac, Superac and Airam.

J. Andersen & Co.

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HIGH POROSITY

. . as a characteristic of a paper maker's felt will, not only add to the life of felt, but saves time lost on the machine due to excessive shut downs for washing. Specify

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ECCO CLAYS TRADE MARK

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English China Clays Sales Corporation
551 Fifth Avenue, New York City

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, May 11, 1938.

BLANC FIXE—The prices of blanc fixe continue steady and conform to prevailing quotations. The pulp is quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—The price of bleaching powder is firm and unchanged at prevailing quotations. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The demand for casein continues good. Prices are unchanged for the week. Domestic standard ground casein is offered at 7 cents per pound; domestic finely ground at 8 cents per pound. All prices in bags, car lot quantities.

CAUSTIC SODA—Prices of caustic soda continue steady and conform to prevailing quotations. Solid caustics soda is quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—The prices of china clay are reported as firm and unchanged at prevailing quotations. Imported clay is quoted at from $14.50 to $25 per ton, ship side. Domestic filler clay is offered at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton at mines.

CHLORINE—The price of chlorine continues unchanged. Chlorine is offered at $2.15 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The demand for rosin is reported as fair. Prices are lower for the current week. "G" gum rosin is quoted at $4.35; wood rosin at $4.25 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent gum rosin size is offered at $2.53 per 100 pounds, f.o.b., shipping point.

SALT CAKE—Prices of salt cake continue steady at prevailing quotations. Quotations range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12 per ton, f.o.b., shipping point. Imported salt cake is offered at from $14.50 to $15 per ton, Gulf or Atlantic Seaboard, on dock.

Soda Ash—The prices of soda ash are steady and conform to prevailing quotations. Prices of soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05, and in barrels, $1.35.

STARCH—The corn starch market is reported as firm, with prices unchanged for the current week. Globe pearl is quoted at $2.60 per 100 pounds, in bags, and at $2.85 in barrels. Special paper starch is offered at $2.70 per 100 pounds, in bags, and at $2.95 in barrels; all prices in car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—The prices of sulphate of alumina continue steady at prevailing quotations. The commercial grades are quoted at from $1.25 to $1.60 per 100 pounds; iron free at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The prices of sulphur continue firm and unchanged at prevailing quotations. Annual contracts are quoted at $18 per long ton, f.o.b., cars at mines. Spot and nearby car lots are quoted at $21 per ton.

TALC—The talc market reports prices steady and unchanged at prevailing quotations. Domestic talc is offered at from $15 to $18 per ton, Eastern mines. Imported talc is quoted at from $25 to $40 per ton,

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$5.12½	@	$5.37½
Superstandard	5.00	@	—
Northern Standard Wrapping	4.50	@	—
Standard Wrapping	4.00	@	—
Tissues—Per Ream—Carlots			
White No. 1	.92½	@	—
White No. 1 M. G.	.90	@	—
White No. 1½	.67½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	3.20	@	—
Bleached Toilet	5.26	@	—
Paper Towels—			
Unbleached	1.80	@	—
Bleached	2.10	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	$8.25	@	$10.25
No. 2 Jute	7.50	@	9.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Boards, per ton—			
News	$30.00	@	—
Chip	30.00	@	—
Sgl. Mla. Lt. Chip.	45.00	@	—
Jute Lined Chip	45.00	@	—
White Pat. Coated	57.50	@	—
Kraft Liners	55.00	@	—
Binders Boards	75.00	@	80.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds		Ledgers		
100% Rag Ext. No. 1	$41.40	@	$48.50	$42.55 @	$50.00
100% Rag	32.80	@	38.50	33.95 @	39.75
85% Rag				31.65 @	37.25
75% Rag	24.75	@	29.00	25.90 @	30.50
65% Rag	21.65	@	26.25	22.80 @	27.75
50% Rag	18.70	@	22.75	19.90 @	24.25
45% Rag	15.80	@	19.25	16.95 @	20.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra

Sulphite Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds		Ledgers		
No. 1	$8.80	@	$10.75	$9.95 @	$12.00
No. 2	7.90	@	9.50	9.05 @	11.00
No. 4	7.00	@	8.50	8.20 @	10.00

Colors $1.00 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper,
Delivered in Zone 1:

No. 1 Glossy Coated	$12.15	@	$14.25
No. 2 Glossy Coated	10.55	@	12.25
No. 3 Glossy Coated	9.35	@	11.00
No. 4 Glossy Coated	8.80	@	10.50
No. 1 Antique (watermarked)	8.80	@	10.50
No. 2 Offset	8.05	@	9.50
A Grade E. F.	7.90	@	9.50
A Grade S. & S. C.	8.15	@	9.75
B Grade E. F.	7.30	@	8.75
B Grade S. & S. C.	7.55	@	9.00
C Grade E. F.	7.00	@	8.50
C Grade S. & S. C.	7.25	@	8.75
D Grade E. F.	6.75	@	8.25
D Grade S. & S. C.	7.00	@	8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	27.00	@	30.00
Dry	27.00	@	30.00
(Delivered)			
No. 1 Domestic and Canadian	29.00	@	33.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.00	@	3.50
Prime Qualities—			
Easy-Bleaching Sulphite	2.50	@	2.75
Strong Unbleached Sulphite	2.25	@	2.50
(On Dock, Atlantic Ports)			
Kraft Bleached	3.00	@	3.25
Kraft Light & Strong	2.25	@	2.50
Kraft No. 1	2.00	@	2.15
Kraft No. 2	1.90	@	2.00
(F.o.b. Pulp Mill)			
Kraft Domestic	2.00	@	2.35
(Delivered)			
Soda Bleached	2.90	@	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.25	@	6.50
Silesias No. 1	5.00	@	5.2
New Unbleached	6.25	@	6.50
Blue Overall	4.00	@	4.50
Fancy	3.00	@	3.10
Washables	2.10	@	2.25
Mixed Khaki Cuttings	3.60	@	3.75
O. D. Khaki Cuttings	4.35	@	4.50

Old Rags

White, No. 1—			
Repacked	3.40	@	3.50
Miscellaneous	2.75	@	3.00
White, No. 2—			
Repacked	2.10	@	2.25
Miscellaneous	1.70	@	1.80
Thirds and Blues—			
Repacked	1.40	@	1.50
Miscellaneous	1.25	@	1.30
Roofing Rags—			
No. 1	.90	@	.95
No. 2	.70	@	.75
No. 3 (bagging)	.65	@	.70
No. 4	.65	@	.70
No. 5A	.65	@	.70

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	@	2.25
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxford	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.50
No. 2 White Linens	6.50	@	7.50
No. 3 White Linens	4.50	@	5.50

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All kinds and styles of Felts for all kinds and styles of Papers.

Write us about your Felt problems and let us help you reduce your Felt Costs—we will call anywhere at any time.

DRAPER BROS. COMPANY

CANTON, MASS.

Woolen manufacturers since 1856

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It's Time To Modernize!

Tell us your needs and we'll send complete information and blue prints of Kalamazoo Vitrified Glazed Tile for Jordan Chests, beater storage chests, beater dump chests, Fletcher-Bleachers, and stock chests. Also Wood Tanks, Acid Tanks, and Blow Pits.

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KALAMAZOO, MICHIGAN

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ORISKANY, NEW YORK

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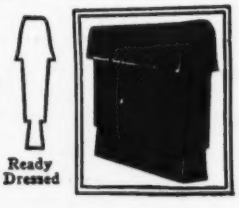
LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL



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ROTARY CARD CUTTERS
SLITTERS FOR VULCANIZED FIBRE

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Sta. "O" Phila., Penna

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	@	4.75
No. 2 White Cotton.	3.25	@	3.75
No. 3 White Cotton.	2.50	@	3.00
No. 4 White Cotton.	1.90	@	2.20
Extra Light Prints..	2.00	@	2.40
Ord. Light Prints...	1.75	@	2.15
Med. Light Prints...	1.55	@	1.95
Dutch Blue Cottons	2.25	@	2.50
French Blue Linens..	3.00	@	—
Checks and Blues...	2.00	@	—
Linsey Garments....	1.90	@	2.00
Dark Cottons.....	1.50	@	1.60
Old Shopperies.....	1.30	@	1.45
New Shopperies.....	1.45	@	1.50
French Blues.....	2.25	@	2.50

Old Rope and Bagging

Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.25	@	2.35
Domestic	2.20	@	2.25
Wool Tares, light....	1.50	@	1.75
Wool Tares, heavy..	2.00	@	2.10
Bright Bagging.....	1.60	@	1.70
Manila Rope—			
Foreign	3.00	@	3.25
Domestic	2.75	@	3.00
Jute Threads.....	2.75	@	3.00
Sisal Strings.....	1.75	@	2.00
Mixed Strings.....	.60	@	.70

Old Waste Papers

F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.25	@	2.35
Ordinary Hard White No. 1....	1.90	@	2.00
Soft White No. 1..	1.80	@	2.20
Flat Stock—			
Stitchless	.70	@	.80
Overissue Mag.....	.60	@	.70
Solid Flat Book....	.55	@	.60
Crumbled No. 1....	.40	@	.45
Ledger Stock.....	.90	@	.95
New B. B. Chips....	.15	@	.20
Manila—			
New Env. Cut....	1.85	@	2.00
New Cuttings.....	1.50	@	1.60
Old Kraft Machine—			
Compressed bales..	.70	@	.80
News—			
No. 1 White News	1.25	@	1.30
Strictly Overissue.	.45	@	.50
Strictly Folded....	.20	@	.25
No. 1 Mixed Paper..	.05	@	.10

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.11	@	.13
White Hemp.....	.12	@	.14
Fine Polished—			
Fine India.....	.15	@	.17
Unpolished—			
Box	.08½	@	—
Paper Makers.....	.07½	@	.08½
Tube Rope.....	.09	@	.10
Wall Paper.....	.10	@	.11
Wrapping	.11	@	.13
Soft Fiber Rope...	.09½	@	.11½
Cotton	.15	@	.20

(Hard Fiber)

Medium Java.....	.09	@	.10
Mex. Sisal.....	.08½	@	.09½
Manila	.18	@	.25

Domestic	2.25	@	2.50
Sisal Rope.....	1.65	@	1.75
Mixed Rope.....	.50	@	.55
Transmission Rope...	1.25	@	1.50
Soft Jute Ropes.....	1.90	@	2.00
Jute Carpet Threads.	1.00	@	1.50
Gunny Bagging—			
Foreign	2.20	@	2.25
Domestic	1.80	@	1.90
Bleachery Burlap....	3.25	@	3.75
Scrap Burlap—			
Foreign	1.65	@	1.80
Domestic	—	@	1.90
Scrap Sisal	1.25	@	1.50
Scrap Sisal for Shredding	1.75	@	1.90
Wool Tares, Heavy..	1.50	@	1.60
New Burlap Cuttings	1.85	@	2.00
Aust. Wool Pouches..	2.75	@	3.00
Heavy baling bagging	2.00	@	—
Paper Mill Bagging.	1.50	@	1.60
No. 2 Bagging.....	.50	@	.60

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.03	@	.03¼
New White No.1..	.06¾	@	.07
New White No. 2.	.05	@	.05½
New light flannelettes	.04½	@	.05
Silesias No. 1.....	.04½	@	.05
New Black Silesias..	.03¾	@	.04
Silesias No. 1			
Soft Unbleached.....	.06¾	@	.07
Blue Cheviots.....	.05	@	.05½
Fancy	.03	@	.03¼
Washable	.02¾	@	.03

Cottons—According to grades—			
Blue Overalls.....	.04¾	@	.05¼
New Black, soft...	.03¾	@	.04
Khaki Cuttings....	.03¼	@	.03½
O. D. Khaki.....	.04	@	.04½
Corduroy	.02¾	@	.03
New Canvas.....	.07¼	@	.07¾
B.V.D. Cuttings.....	—	@	.06½

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.63¾
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1.....	1.00	@	1.10
No. 2.....	.75	@	.85
No. 3.....	.65	@	.70

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	1.00	@	1.15
Dutch Blues.....	2.75	@	2.90
New Checks and Blues	2.85	@	3.00
Old Fustians.....	2.50	@	2.60
Old Linsey garments.	1.75	@	1.90
New Silesias.....	6.00	@	6.50

PHILADELPHIA

Domestic Rags (New)

Price to Mill, f. o. b. Phila.)

Cuttings—			
New White, No. 1.	.05½	@	.06
New White, No. 2.	.03½	@	.04
Light Silesias.....	.04½	@	.05
Silesias, No. 1....	—	@	.04½
Black Silesias, soft.	.03	@	.03½
New Unbleached..	—	@	.06
Washable, No. 1..	.01¼	@	.01½
Blue Overall.....	.04	@	.04½
Cottons—According to grades—			
Washable No. 2...	.01	@	.01¼
New Blue.....	.01	@	.01¼
Fancy Percales....	—	@	.02½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.04½
New Dark Seconds	.50	@	.75
Khaki Cuttings—			
No. 1 O. D.....	.03½	@	.04
No. 2 Mixed.....	.02	@	.02½
Corduroy	—	@	.02
New Canvas.....	.05	@	.05½
New Black Mixed.	.02½	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	2.50	@	3.00
Miscellaneous	2.25	@	2.50
Twos and Blues—			
Miscellaneous	1.00	@	1.25
Repacked	1.00	@	1.25
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1....	—	@	.75
Domestic No. 1...	—	@	.75
Domestic No. 2...	.50	@	.65
Roofing Bagging..	.80	@	.90

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.50	@	1.75
Domestic	1.50	@	1.75
Manila Rope.....	3.00	@	3.25
Sisal Rope.....	1.75	@	2.00
Mixed Rope.....	.75	@	1.00
Scrap—			
No. 1.....	—	@	1.25
No. 2.....	1.00	@	1.25
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	1.75	@	2.00

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.35	@	2.40
No. 2 Hard White.	2.00	@	2.10
No. 1 Soft White..	2.00	@	2.10
No. 2 Soft White..	1.40	@	1.50
No. 1 Mixed.....	.70	@	.75
Solid Ledger Stock..	1.50	@	1.60
Ledger Stock, white.	1.25	@	1.30
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy..	.85	@	.90
Manila Cuttings.....	1.50	@	1.75
Print Manila.....	.45	@	.50
Container Manila....	—	@	.40
Kraft Paper.....	.90	@	.95
No. 1 Mixed Paper..	.25	@	.30
Straw Board Chip...	.25	@	.30
Binders Board Chip.	.25	@	.30
Corrugated Board...	.50	@	.55
Overissue News.....	.55	@	.60
Old Newspapers	.30	@	.35

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.25	@	2.40
No. 1 Soft White..	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	.65	@	.75
No. 1 Books, light...	.65	@	.75
Crumpled Stitchless Book Stock.....	.55	@	.65
Manila Env. Cuttings	1.60	@	1.70
Manila Envelope Cuttings, extra quality	2.00	@	2.10
No. 1 Old Manila....	.85	@	.95
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	—	@	.80
Mixed Papers.....	—	@	.10
Print Manila.....	.45	@	.50
Container Manilas...	.27½	@	—
Old Newspapers.....	.25	@	.32½
Paper Wool Strings..	—	@	.50
Overissue News.....	.45	@	.50
Box Board Chips....	.20	@	.25
Corrugated Boxes....	.25	@	.27½
Kraft corrugated boxes	.60	@	.65
Screenings wrappers.	.45	@	.50

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.50	@	2.75

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	1.80	@	1.90
No. 1 Hard White.	1.70	@	1.80
No. 1 Soft White..	1.50	@	—
Ledger & Writings..	.75	@	.80
Solid Books.....	.55	@	—
Blanks	.90	@	—
Krafts	.60	@	—
New Kraft Cuts.....	1.10	@	—
Manila Env. Cuts...	Nominal		
Ex. No. 1 Manila...	Nominal		
Print Manila.....	Nominal		
Overissue News.....	.35	@	—
Old Newspapers—			
No. 1 Folded News	.30	@	—
No. 1 Mixed Paper	.20	@	—
Roofing Stocks—			
No. 1.....	2.00	@	2.10
No. 2.....	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	.36½
No. 1 Tints	.36½	@	.37½
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	—	@	.1550
No. 4 Tints	.16	@	.1650
No. 5 Bond—White .11.35		@	—
No. 5 Bond—Tints .12.35		@	—
No. 5 Bond—Golden Rod 13.35		@	—
No. 5 Ledger—White .1185		@	—
No. 5 Ledger—Tints. .1285		@	—
No. 6 Bond—White .10.75		@	—
No. 6 Bond—Tints .11.25		@	—
No. 6 Bond—Golden Rod 12.75		@	—
No. 7 Bond—White . 9.10		@	—
No. 7 Bond—Tints . 9.60		@	—
No. 7 Bond—Golden Rod 11.10		@	—
Book—			
No. 1 M. F.	7.10	@	7.35
No. 2 M. F.	6.85	@	7.20
No. 3 M. F.	5.60	@	6.20
No. 1 S. C.	7.60	@	7.85
No. 2 S. C.	7.10	@	7.35
No. 3 S. C.	6.10	@	6.35
No. 1 Coated and Litho 12.50		@	—
No. 2 Coated and Litho 11.00		@	—
No. 3 Coated and Litho 9.50		@	—
Coated tinted.....13.50		@	—
Wrapping—delivered—			
Rag Brown.....	4.85	@	5.55
White Wrap.....	4.00	@	—
"B" Manila.....	4.90	@	6.25
No. 1 Manila.....	5.50	@	7.00
Fiber	5.50	@	—
Kraft, No. 2.....	5.50	@	—

(F. o. b. Cars, Toronto)

News, per ton—			
Rolls (contract)..$46.00		@	—
Sheets 54.00		@	—

Pulp

Ground wood.....29.50		@	—
Unbleached Sulphite.54.00		@	—
Book (Class 1).....64.00		@	—
Writing (Class 2)...62.00		@	—
Select (Class 3).....63.00		@	—
Kraft 50.00		@	—
Soda 56.00		@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.25	@	—
Soft White.....	2.15	@	—
White Blk. News..	1.25	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	.80	@	—
Light and Crumpled Book Stock.	.75	@	—
Ledgers and Writings	1.10	@	—
Manilas—			
New Manila Cut...	1.35	@	—
Printed Manilas...	.55	@	—
Kraft	1.00	@	1.55
News and Scrap—			
Strictly Overissue.	.55	@	—
Strictly Folded....	.50	@	—
No. 1 Mixed Paper..	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.06¾	@	.07
Fancy Shirt Cuttings	.02½	@	.03¼